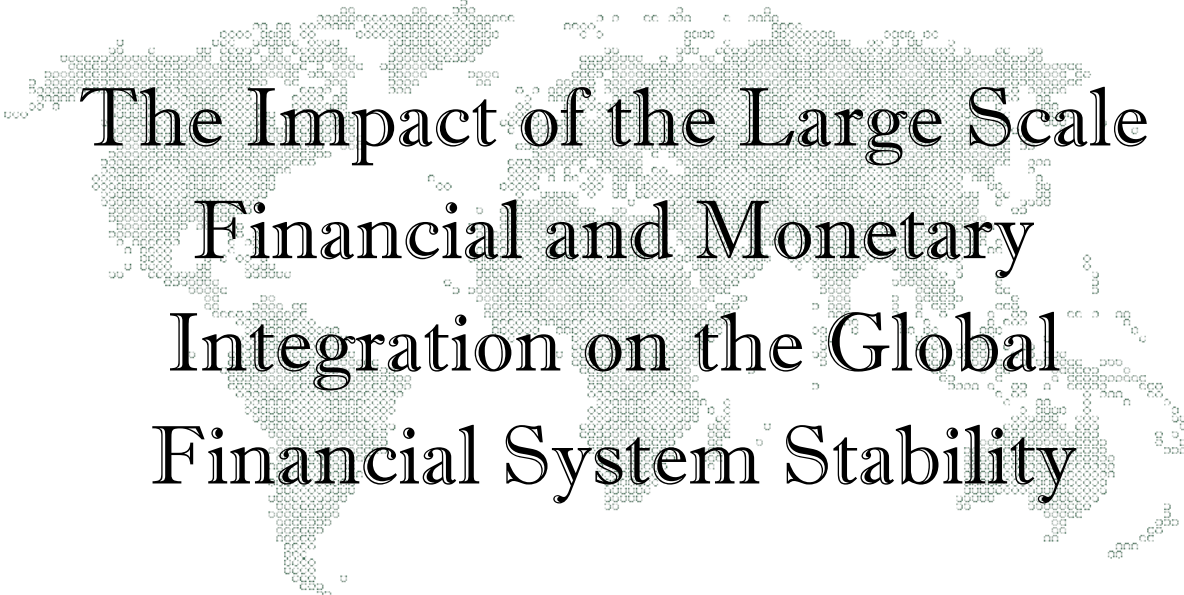# The Impact of the Large Scale Financial and Monetary Integration on the Global Financial System Stability

Investigation of Vulnerabilities Arising from the Interplay between Systemic and Systematic Integration Dynamics

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Abstract

By exploring in great detail the notions of the global financial system (GFS), financial integration, monetary integrations and systemic crises, the inquiry aims to understand the effects integration processes have on the transmission of instabilities through the substructures of the GFS. In particular, the focus is on the transmission of systemic instabilities through the international banking system and in-between different national financial systems (NFSs). The analysis is aided by a review of two groups of models from the research in Complex Systems Studies. The first comprises the results obtained in banking systems analyses, the second focuses on the aggregate financial dynamics between the national economies and correlations between financial indices. The inquiry argues for three research directions which could provide a better understanding of the effects arising from the interplay between financial and monetary integration processes.

Key terms: financial systems, financial integration, monetary integrations, systemic crises, (shadow) banking systems, network theory

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List of Abbreviations

ABSs – asset-backed securities
ADB – the Asian Development Bank
AIG – the American International Group
ALBA – the Bolivian Alliance for Americas
ASEAN – the Association of Southeast Asian Nations
AUSTRAC – the Australian Transaction Reports and Analysis Centre
BaFin – the Federal Financial Supervisory Authority of Germany
BIS – the Bank for International Settlements
BCBS – the Basel Committee on Banking Supervision
BOP – balance of payments
BRIC(S) – Brazil, Russia, India, China (and South Africa)
CAEMC – the Economic and Monetary Community of Central Africa
CDOs – collateralized debt obligations
CDSs – credit default swaps
CEECs – Central East European Countries
CFA – La Communauté financière Africaine
CMA – the Common Monetary Area (of Southern Africa)
CMI – the Chiang Mai Initiative
CPIS – the Coordinated Portfolio Investment Survey
CRAs – credit rating agencies
EAC – the East African Community
EC – the European Commission
ECB – the European Central Bank
ECCU – the East Caribbean Currency Union
ECOWAS – the Economic Community of West African States
EFSF – the European Financial Stability Facility
EMEAP – the Executives' Meeting of East Asia and Pacific Central Banks
EMU – the European Economic and Monetary Union
ERM – the European Exchange Rate Mechanism
ESM – the European Stability Mechanism
EU – the European Union
ESDC – European sovereign debt crisis
FATF – the Financial Action Task Force
FCA – the Financial Conduct Authority
FDI – foreign direct investment
FDIC – the Federal Deposit Insurance Corporation
FED – the Federal Reserve of the United States of America
FinCEN – the Financial Crimes Enforcement Network
FIUs – financial intelligence units
FSA – the Financial Services Authority
FSB – the Financial Stability Board
G7/G20 – the Group of 7/20
GATT – the General Agreement on Tariffs and Trade
GAFTA – the Greater Arab Free Trade Area
GCC – the Gulf Cooperation Council
GDP – gross domestic product
GFC – the global financial crisis of late 2000s
GFS – the global financial system
GFSM – the Global Financial Stability Map

GFSN – the Global Financial Safety Net
GSEs – government sponsored enterprises
IAASB – the International Auditing and Assurance Standards Board
IAIS – the International Association of Insurance Supervisors
IASB – the International Accounting Standards Board
IOSCO – the International Organization of Securities Commission
IFA – international financial architecture
IFC – international financial center
IIF – the Institute of International Finance
(I)LOLR – (international) lender of last resort
IMF – the International Monetary Fund
IMS – international monetary system
IFN, ITN – international trade/financial network
LCFIs – large, complex financial institutions
LPFC – limited purpose finance company
LTCM – the Long-Term Capital Management hedge fund
MENA – Middle East and North Africa region
MERCOSUR – the Southern Common Market
NAFTA – the North American Free Trade Area
NFSs – national financial systems
OCA – optimum currency area
OCC – the Office of the Comptroller of the Currency
OECD – the Organization for Economic Co-operation and Development
OFC – offshore financial center
OPEC – the Organization of Petroleum Exporting Countries
OTC – over-the-counter markets
PRA – the Prudential Regulatory Authority
S&P – Standard & Poor's
SAARC – the South Asian Association for Regional Cooperation
SACU – the Southern African Customs Union
SARB – the South African Reserve Bank
SBS – the 'shadow' banking system
SBP – the State Bank of Pakistan
SIVs – structured investment vehicles
SOCA – the Serious Organized Crime Agency
SPIEF – the St. Petersburg's International Economic Forum
SPRD – the (IMF's) Strategy, Policy and Review Department
SWFs – sovereign wealth funds
WAEMU – the West African Economic and Monetary Union
WAMZ – the West African Monetary Zone
U.K. – the United Kingdom of Great Britain and Northern Ireland
U.S. (USA) – the United States of America
USSR – the Union of Soviet Socialist Republics
WAMZ – the West African Monetary Zone
WBG – the World Bank Group
WTO – the World Trade Organization
WWI – World War I
BA, CS, ER, GK, MA, NYYA, WS – abbreviations for models revised in section 2.5

Science seeks to reduce the connection discovered to the smallest possible number of mutually independent conceptual elements. It is in this striving after the rational unification of the manifold that it encounters its greatest successes, even though it is precisely this attempt which causes it to run the greatest risk of falling a prey to illusions.

Einstein, 1940

1. Introduction

Understanding large scale transformations in man-made infrastructural systems is often a frustrating endeavor. Considerable resources are needed to manage, sustain, and encourage infrastructural development in a desirable direction. Failure to perform these actions stimulates the risks for further, and often larger, damages and collapses. The recovery of the system is arguably the costliest part of the endeavor, as it exhausts the most valuable of all resources – time.

Financial systems, as one of the fastest evolving families of infrastructural systems, are no exception. Stimulated by technological development, liberalization of national markets and international coordination, financial activity occurs continuously: around the world and around the clock. The extent of today's financial globalization considerably outweighed that of the previous globalization era[1].

The level of international integration of financial markets and institutions is thus historically unprecedented in its scope and depth (Bordo, Eichengreen, & Irwin, 1999).

Despite its level, the integration process remains fairly heterogeneous in different regions, both with respect to its pace and the impact on regional financial development. Bordo et al. argue that financial integration has brought about comparable, if not higher, levels of financial instability to those from the first globalization era[2]. Since the 1971 fall of Bretton-Woods system marked the beginning of the current integration, there have been roughly 174 currency crises, 90 systemic banking crises, 55 episodes of sovereign defaults, 26 twin crises[3], eight triple crises and one global financial crisis (GFC) (Laeven & Valencia, 2008).

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[1] 1870 – 1913

[2] three global financial crises marked the era: the 1890 Baring crisis, the Panic of 1907 and the WWI liquidity crisis
[3] simultaneously occurring banking and currency crises, while a triple crisis involves as well a sovereign default

The process of global financial integrations is not the main culprit for the instabilities. However, many of these crises do find their origin in the dissonance between the market integration tendencies and the desire of national authorities to preserve autonomous decision making. The switch of paradigms in the transition from the 'embedded liberalism' of the pre-1971 era to the current financial globalization is rather radical. Under the former setting, financial integration occurred only to the extent to which it did not interfere with the values and interests of individual nations. Under the latter, states can operate only to the extent to which they do not obstruct the functioning of the shared markets. Failure to perform in such a manner is a solid basis for a financial crisis (Jones, 2001).

Under the new conditions, external shocks originating in countries seemingly distant and unrelated to the domestic economy may profoundly disturb the national financial system and cause crises. As the number of crisis events since 1971 suggests, threats of exchange rate collapses, sharp shifts in asset prices and banking crises are all equally antagonizing for the national authorities. Countries' external portfolio volumes are currently such that variation in exchange rates and asset prices can cause significant reallocation of wealth, and thus large external imbalances (Lane & Milesi-Ferretti, 2007; Degryse, Elahi, & Penas, 2010). Analogously, magnitude of banking systems' foreign exposure limits significantly the effectiveness of bailouts, bankruptcies and nationalizations in alleviating financial crisis. In the integrated setting, bailouts intensify the flow of funds out of the economy, bankruptcies can severe the flows of capital, while nationalizations impose political pressure on the authorities to take over responsibility for the banks' debt, and encourage thus moral hazard. Financial integration poses therefore great challenges, as countries struggle to

assure both the stability of financial flows and the functionality of the underlying architecture. Prioritizing these two goals limits the success of monetary policies at ensuring full employment (Crockett, 1993; Alfaro, Kalemli-Ozcan, & Volosovuch, 2007; Pruski & Szpunar, 2008). Furthermore, maneuvering required to address all these conflicting goals can force the authorities to be perpetually inconsistent in policy designs and execution. Inconsistencies eventually threaten their credibility (Dooley & Svensson, 1994) and low credibility can, as a result, worsen the national terms of borrowing.

National economies devised a number of mechanisms to cope with the financial integration. Particularly interesting is the approach pioneered by the European Community, which entails answering the global financial integration with another type of large scale integration. In 1989, the President of European Commission, Jacques Delors, mapped the road towards establishing the European Economic and Monetary Union (EMU)[4]. With its agenda reaching far beyond addressing purely the financial stability of its members, the EMU preserved recognition of the threat posed by the integrated capital markets as one of the main momentum generators for its development (Jones, 2001; de Grauwe, 2006). This revolutionary experiment in the history of international economic affairs eventually brought together 17 different national economies into a single monetary area (Krugman & Obstfeld, 2009). It also created incentives for a number of other European economies to join in the future. A notable characteristic of the union, however, is that it allowed for a considerable heterogeneity in fiscal policies of its constituents (EC EMU, 2010). This came to be particularly detrimental for the EMU, as the sovereign debt

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[4] also known as the Eurozone, the Euro Area, the Euro Project

crises[5] occurred anyhow in a number of peripheral economies. In fact, the EMU framework stimulated the proliferation of crises[6]. The European sovereign debt crisis (ESDC) put at risk more than six decades of integration efforts. It reached the point at which it threatens the structure and the regulation of the entire EU.

The idea behind the European model is, in spite of its apparent faults, appealing for a great number of developing economies in Asia, Africa and Latin America. It exemplifies how regional cooperation and consolidation can help further exploration of the benefits from financial integration. Cooperation can secure peace, create economic opportunities, improve competitiveness and bring the region higher political weight in international decision making (Helleiner & Pagliari, 2010; Dieter H. , 2010). It also allows for partial insulation of the member states from external turmoil, by mitigating the exchange rate related risks and by establishing common safety nets and bailout funds (Jones, 2001). Conversely, regional integrations make all the parties sensitive to developments in other member economies, and to a far greater extent than mare integration into the global financial system. As seen recently in the example of Greece, mismanagement in one member country's economy can have a profoundly harmful impact on the others (Arghyrou & Kontonikas, 2011). Furthermore, a history of rivalry and conflicts can lead to political instability in times of crisis (Carranza, 2004). Finally, disintegration through market closure, restrictions of capital movement or reestablishment of national currencies can come at a high cost not only for the participating economies but also for the rest of the GFS (Schmukler, 2004).

In recent history financial disintegration occurred almost exclusively following political disintegrations, e.g. the USSR, or systemic crisis events, e.g. Malaysia and Iceland, with swift reversals once internal issues were resolved. Financial integration has thus persisted as a global trend for decades, despite the recurring crises (Lane & Milesi-Ferretti, 2007). It is a systemic trend which mobilizes financial agents to explore wider international opportunities. The extent of regional cooperation and coordination, which emerged as a reaction to this overarching global trend, raises a number of issues however. What are the implications of regionalizations for the stability of the underlying, global system? To what extent can these processes be controlled and their externalities accounted for? Should regionalizations be further encouraged under financial integration?

Structure of the financial systems and the processes on them are both highly intricate. The complexity of an integration process is increasing with the number of engaged parties, as well as with their mutual differences. These primarily include the internal organization, comparative advantage, the capacity of the authorities to monitor and their promptness to act upon instabilities (ECB, 2011b). Additionally contributing to the complexity is the fact that consolidation of various parts of financial systems occur independently of each other (Skippe, 2000). Resolutions of competing interests between the integrating parties tend to be multilateral and to occur simultaneously via a number of overlapping international platforms for cooperation and negotiations [7] (Claessens & Underhill, 2010; González-Páramo, 2010). Increased complexity limits monitoring options, which ensure system's efficient and stable functioning. The overall co-dependences between the agents make it also extremely difficult to devise and implement

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[5] started in November 2009 and is still ongoing at the time of writing

[6] see page 80 for references

[7] e.g. the EU, G7, G20, OECD, ASEAN, OPEC, MERCOSUL

effective policy measures. (Baele, Ferrando, Hördahl, Krylova, & Monnet, 2004). It is therefore important to address the issue of complexity in order to understand the interplay of simultaneous integration processes and their systemic effects.

Accordingly, this report aims to assess as well how the finance-related proceedings from the disciplines within Complex Systems Studies can help this effort. To reduce the scope of the analysis, the focus is set on the interplay between financial and monetary integrations[8]. This confines the inquiry within one structure, the global financial system (GFS) and neglects the international trade framework. Comparisons are, however, made at a number of instants where structure of the systems is discussed. By thoroughly reviewing the economic and financial literature on the GFS, the historical crisis events and the processes of (global) financial and (regional) monetary integrations, three points in particular are identified as crucial for understanding the systemic effects of the interplay.

The first is that the evolution of inter-agent interactions matters. Financial innovation allowed the extent of integration as witnessed today, by introducing new market structures (e.g. the Eurodollar market), innovative ways of providing credit (securitization) and new competitors in the intermediation of short-term savings (e.g. 'shadow banking' institutions). It is important to understand the extent to which these and other innovation advents alter the macro-structure of national financial systems, and particularly how they affect the risk distribution. The second is that, on the global scale, both primary (bi/multilateral) and secondary (unilateral) monetary integrations matter for the spread of systemic crisis events. This is to

say that international arrangements through which individual nations pursue the adjustments of their monetary policies can act to import financial instabilities from the countries with similar arrangements, sometimes regardless of their mutual geographical positioning. Finally, the intrinsic asymmetry of information in the financial systems is seemingly amplified under integrations, with strategies for successful signaling of quality and consistency having greater importance than ever before. It is essential to understand the role of these information related constraints in crisis spreads. For two of these points groups of models are reviewed from the Complex System Studies which can serve as a starting point for their exploration. They are developed in a number of disciplines, with the majority coming from the study of complex networks. The first focuses only on the instabilities arising in the banking systems, as the substructure of the financial system which has reached one the highest levels of international regulatory consolidation[9]. The second considers the aggregate financial interactions between different nations.

The report is structured as follows. Section 2 is the Analysis section, a five-part literature review which contains the core of the inquiry. The first part describes the global financial system as an infrastructural system. The two subsequent parts explain the processes of financial and monetary integrations. The fourth part explores the issue of systemic risk and systemic crisis events on the GFS. Finally, the fifth part focuses on developments in the theoretical models in Complex Systems Studies which can help address the abovementioned points. The section aims as well to analyze the applicability of the reviewed theory to the real cases. Sections 3 and 4 provide the relevant global discussion and concluding remarks.

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[8] fiscal integrations are rare as they limit considerably the sovereignty of integrating parties (Robson, 1998). Economic integration are deemed far too extensive in their scope (EC EMU, 2010)

[9] IAIS is the leader, as its wide membership coordinates over 97% of global insurance premium issuances (IAIS, 2011)

2. Analysis

2.1 The Global Financial System

A financial system is a complex set of closely interacting institutional units and markets which allow for the mobilization and transfer of funds between savers and borrowers. It is a crucial infrastructure to the allocation of resources in a modern economy, as it channels the funds between households and the corporate sector. In addition, it allows for the intertemporal smoothing of expenditures, facilitates the management of risks and acts as one of the principal policy channels (Allen & Gale, 2001).

The system is primarily shaped by extensive regulation and legislation enacted by governments, international regulatory and supervisory frameworks and political agreements (Fonteyne, 2009). It can thus be sorted as soft infrastructure[10] (Ennis, 2003). Unlike the rest of the soft infrastructure systems, the financial system involves direct flows of a measurable quantity - capital. The system's management is thus, in a number of ways, similar to the management of the hard infrastructure[11] systems. Recent cross-disciplinary discussions even brought about some unexploited parallels, particularly in terms of the studies of systems' stability (FED NY, 2007). It is important to differentiate the global financial system[12] (GFS) from national financial systems (NFSs), as they essentially involve agents with different scopes of activities and different levels of regulation.

- Components

The NFSs remain fairly heterogeneous in spite of the current rate of globalization (Mendoza, Quadrini, & Rios-Rull, 2009). The principal difference is in the relative importance placed on the two major constituents of the system: financial markets, as the platforms for direct financial interactions, and financial institutions, as the intermediaries. Financial institutions and individuals interact in financial markets primarily through financial instruments, which essentially are tradable assets.

The type of the financial instrument used determines the subsystem of the financial system to which the interaction belongs. The three principal groups of financial instruments are non-transferables, securities and derivatives. As the name suggests, the first group cannot be traded further on. This group includes loans and deposits[13] and is representing the principal interactions in the classical banking systems. Securities are tradable negotiable instruments representing financial value, e.g. bonds, equities and notes. They can be further on divided depending on the length of the period for which their respectful claims are issued – short term (bills), medium term (notes) and long term (bonds). Derivatives do not exist in their own right but their substance and value is derived from a pool of other financial instruments through a specified contract, e.g. forwards, swaps, options[14]. Diversity of financial instruments reflects the variety in demand expressed in financial markets, under a constant trade-off between risks and returns (Reszat, 2005).

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[10] includes the education system, the health care system, the government and law enforcement and emergency services
[11] electro, gas and water distribution, telecommunications, transportation, sewerage, the Internet, etc.
[12] appropriateness of the term global can be questioned, since there still exist countries and regions that are not part of it. Technically, the term international is more appropriate, but the term global is more common in the literature.

[13] with mortgages already being in usage to back securities, e.g. bonds
[14] commonly treated as a subset of securities

A financial market is a market where financial instruments, commodities and other fungible[15] items are exchanged. The main types of financial markets are: capital markets (for bonds and shares), credit markets (for liquidity), derivatives markets, foreign exchange markets (for currencies), commodity markets (e.g. for precious metals), insurance markets (for risk) and markets for financial services (Madura, 2010). Markets are also sorted according to the ways in which the instruments are being traded (physical, electronic, virtual), according to instruments' origin (domestic, regional, international) and the level of parties involved (individual, household, firm, institutions, internationals). Finally, markets can be compared according to their depth, i.e. their ability to sustain relatively large market orders without impacting the price of financial instruments. Market depth is thus a direct measure of market liquidity (Wiedmann, 2011). The three main economic functions of a market are price determination for traded items, provision of liquidity and reduction of costs of transactions (Fabozzi, 2008). However, transaction costs persist in the financial markets because of the inherent asymmetry of information. It is thus the role of financial institutions to further reduce these costs by gathering information about the markets and by using this information to facilitate transactions (Herring, 1994).

Financial institutions can be split into financial architecture and financial intermediaries. Financial architecture institutions support the transfer of funds between savers and borrowers by establishing systems of regulation, supervision and other utilities that help the work of financial intermediaries. Financial intermediaries are traditionally divided on depository and non-depository institutions (Madura, 2010). Depository financial institutions accept deposits from investors and provide credit through loans or purchase of securities. They intermediate primarily short-term savings. Non-depository financial institutions [16] generate funds through issuance of shares or securities and their consequent transformation into finance company loans, i.e. intermediation of long-term savings. As a result they are commonly considered less central to the payment system and are subject to more liberal regulation. Based on the total assets, commercial banks are the prevailing depository financial institutions, whereas mutual funds are the dominating non-depository institutions (Madura, 2010).

In general discussions the term financial intermediary refers primarily to commercial banks[17]. This is because of their importance for the development of modern financial systems. The principal economic functions of the banks are settlement of payments and credit intermediation, which involves credit, liquidity, risk and maturity transformations. Credit transformation is the enhancement of the credit quality of debt issued by an intermediary through the priority of claims [18] (Pozsar, Adrian, Ashcraft, & Boesky, 2010). Liquidity transformation is the usage of liquid instruments to fund illiquid assets. An example would be a liquid rated security which trades at a higher price compared to the pool of illiquid whole loans which back it up. Risk transformation is the conversion of risky investments into risk free ones, e.g. by lending to multiple borrowers. Maturity transformation is the conversion of highly liquid short-term liabilities into relatively illiquid long-term assets, by allowing for on demand borrowing to be compensated with long term loans. This transformation creates liquidity for the saver but

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[15] whose individual units are mutually substitutable

[16] asset managers e.g. pension funds, mutual funds

[17] banks, from here onwards

[18] the priority of claims relates with the seniority of debt obligations, i.e. order of repayment in the event of bankruptcy, with senior deposits implying higher credit quality

exposes intermediary to both liquidity and solvency risks. The former account for the possibility of bank runs, the latter for the possibility that the value of assets drops below that of liabilities, i.e. a default (Oatley & Winecoff, 2012). Traditionally, banks are regarded as the most effective maturity transformers among financial intermediaries (Madura, 2010).

In the GFC aftermath, the traditional separation of functional roles on depository and non-depository institutions has been challenged. Namely, over the course of previous several decades a substructure emerged which effectively is performing intermediation of short-term savings, but unlike the traditional banking system, these institutions perform it without having access to central bank liquidity or public sector credit guarantees (Pozsar & Singh, 2011). In their right, these institutions are not strictly depository or non-depository institutions, as they are financed by the funds deposited with asset managers. Asset managers demand liquidity because securities borrowers post cash as collateral for securities lent. The institutions provide liquidity in form of money-market instruments. Because they essentially perform a banking function with respect to asset managers these institutions are collectively referred to as the shadow[19] banking system (SBS). Investment banks, structured investment vehicles (SIVs) and limited purpose finance companies (LPFCs) are only some of the SBS institutions. Since these institutions do not always have traditional public sector guarantees to back them up, credit intermediation is relying on third-party institutions for provision of liquidity or credit guarantees, primarily in form of put options.
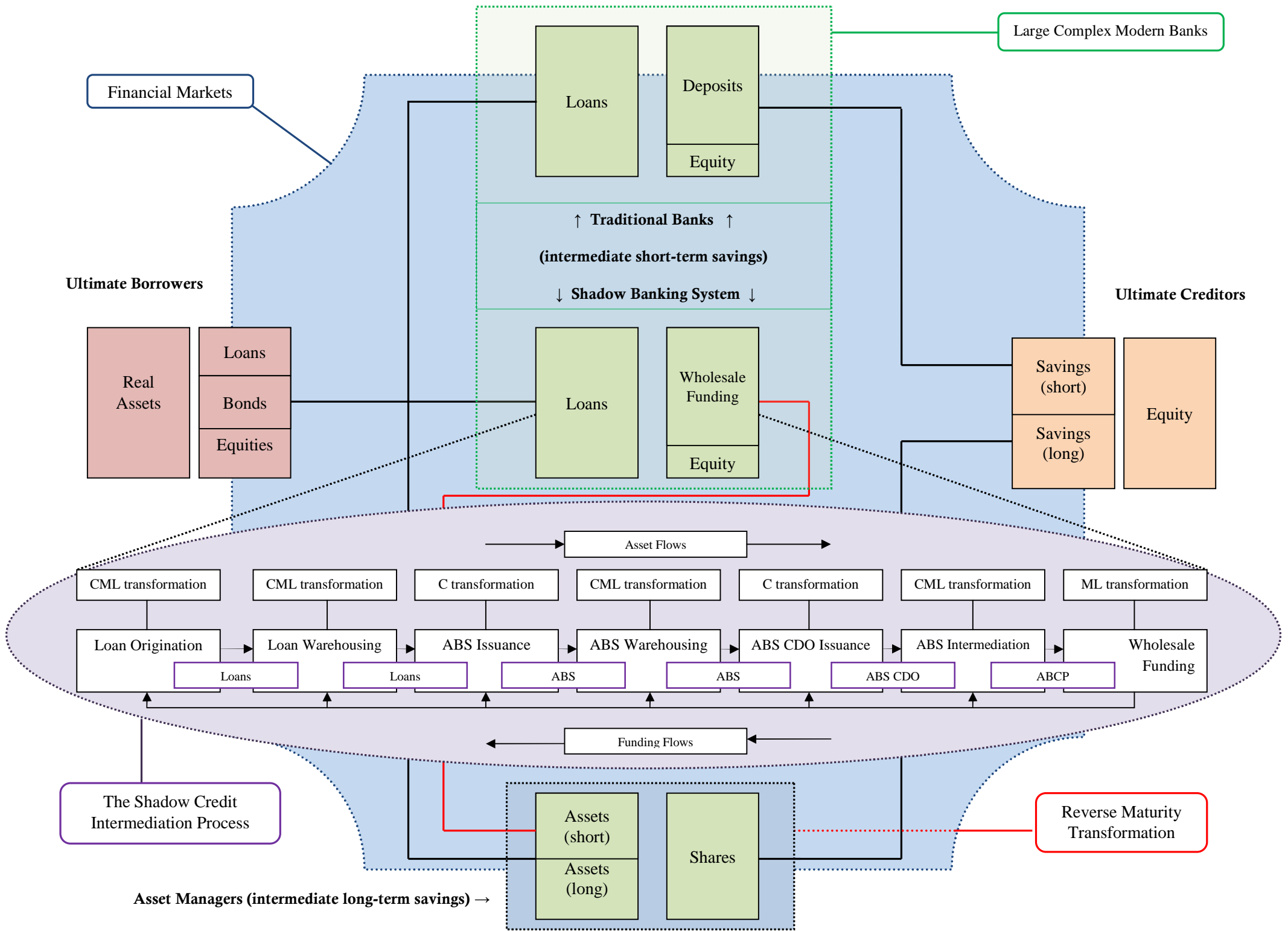
Pozsar et al. argue that the money demand of the asset management complex is often neglected in modern finance. The process is important for the

system because it involves massive reverse maturity transformation, by which a considerable proportion of all long-term investments is transformed back into short-term savings. This process is actually the dominant source of demand for money-type instruments. Furthermore, Pozsar et al. point out that the process is effectively making asset managers the ultimate source of collateral for the SBS, much like the households are the ultimate creditors in an economy. The structure of the system allows furthermore for a single source of collateral to be repeatedly used to underpin different financial interactions: provision of liquidity to costumers, management of interest rates and foreign exchange risk, settlement of trades, provision of security to cash investors. Pozsar et al. name this feature of the system the dynamic chains of collateral usage.

Each shadow banking institution specializes in a particular aspect of credit intermediation, instead of having the entire process internalized within one, bank-like type of institutions. Pozsar et al. identify seven distinct steps of shadow banking intermediation[20], which are performed in a strict, sequential order, each by a specific type of shadow 'bank' and through a specific technique (Pozsar, Adrian, Ashcraft, & Boesky, 2010). The authors also differentiate between three subsystems within the SBSs based on the level of guarantees provided for credit intermediation: directly publicly enhanced, indirectly publicly enhanced and unenhanced. Schema below gives a simple representation of a financial system, including all the previously discussed components. It is a composition of representations given in Allen and Carletti, Pozsar and Singh and Pozsar et al. (Allen & Carletti, 2009; Pozsar & Singh, 2011; Pozsar, Adrian, Ashcraft, & Boesky, 2010).

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[19] epithet 'shadow' is to imply that the system is not as strongly regulated as the traditional banking system

[20] but can be longer or shorter, depending on the quality of the underlying loan pool at the beginning of the chain

Large Complex Modern Banks

Financial Markets

Ultimate Borrowers

Ultimate Creditors

Loans

Deposits

Equity

↑ **Traditional Banks** ↑

(intermediate short-term savings)

↓ **Shadow Banking System** ↓

Real Assets

Loans

Bonds

Equities

Loans

Wholesale Funding

Equity

Savings (short)

Savings (long)

Equity

Asset Flows

CML transformation | CML transformation | C transformation | CML transformation | C transformation | CML transformation | ML transformation

Loan Origination | Loan Warehousing | ABS Issuance | ABS Warehousing | ABS CDO Issuance | ABS Intermediation | Wholesale Funding

Loans | Loans | ABS | ABS | ABS CDO | ABCP

Funding Flows

The Shadow Credit Intermediation Process

Reverse Maturity Transformation

Assets (short)

Assets (long)

Shares

Asset Managers (intermediate long-term savings) →

The SBS institutions are often labeled as arbitrage seekers with altogether limited or negative economic value for the wider system. However, a large segment of them is in fact performing valuable functions, like the facilitation of credit extension and provision of a range of vehicles for management of credit, liquidity and maturity risks. The aftermath of the GFC unveiled also the sheer size and connectedness of SBSs in the major global economies (BIS, 2011). In 2011 the FSB estimated that the size of the SBSs of the 11 largest financial economies surpassed the pre-crisis levels and was close to $51trillion[21] total, with the global SBS value estimated at $60 trillion (Masters, 2011). This is to say that the global SBS makes one quarter of the entire GFS, and that its value has reached nearly one half of the value of the traditional global banking system.

The growth of the SBS was temporarily discouraged by the GFC, because the most developed SBS in the world, the SBS of the U.S. was the very epicenter of the crisis. The GFC showed that SBS has grown large enough to increase considerably the aggregate maturity transformation performed by the GFS, and impose great systemic risks (Turner, Leverage, Maturity Transformation and Financial Stability: Challenges Beyond Basel III, 2011). Consequently, a strong international regulatory effort was exerted to get better control over the SBS and to simplify relations between the SBS and the traditional banking sector. In spite the efforts, the global SBS recovered beyond the pre-GFC levels and continues to grow. The U.S. share in the global SBS declined, however, from 54 to 46%, implying international expansion (Masters, 2011). The overall trend is radically changing the structure of NFSs and is challenging everybody's understanding of how the NFSs and the GFS are actually functioning.

- Heterogeneity

Though nearly all financial systems contain both structures, traditional analysis will juxtapose the market-oriented financial system of the United States to the bank-based financial system of Germany as the two existing extremes (Allen & Gale, 2001; Reszat, 2005). In the former setting there is a strong emphasis on the importance of transparency and control [22] for the successful functioning of the markets. Accordingly, publicly listed firms have to provide a great deal of information about their activities under the exclusive disclosure requirements, and there exist 'firewalls' which separate different types of financial services. Banking sector, in particular, has restrictions on participation in insurance or real estate related businesses. Competition with other providers of finance is intensified and, as a result, banks are more efficient.

On the other hand, in the bank-based systems a firm's external financing is met primarily through its arrangements with the banks, which are by default universal and can provide a wide range of financial services[23]. Though stimulating cooperative behavior and efficient intertemporal smoothing, the strength of the relationship between banks and firms under this setting is a source of numerous inefficiencies, primarily because of the lack of competition. In the midrange, the U.K. financial system reserves a central role for the financial markets, while banking system remains highly concentrated, and a small number of banks dominate the industry. Individual institutions which make these different structures are also fundamentally different across borders. Banks in the U.S. differ profoundly from the banks in Germany,

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[21] compared to $50 trillion in 2007 and $47 trillion in 2008

[22] the U.S. NFS prior to the 1999 repelling of the Glass-Steagall Act in 1999, and after the implementation of the 2010 Dodd-Frank Act

[23] apart from the commonly restricted insurance services

despite the fact that they both perform equivalent functions for respectful NFSs (Merton & Bodie, 1995). Furthermore, it is important to note that the structure of financial systems is constantly changing. For instance, the EU integrations increased the importance of financial markets on the continent.

NFSs vary with respect to the relative shares of credit, equity and bond finance in financial markets. In Europe the highest share is in credit markets, in the U.S. bond and equity shares are codominant, while in Japan credit and equity shares are the dominating ones (ECB, 2011b). The extent of financial development is another important determinant. There exist highly developed systems with deep financial markets and strong financial institutions, e.g. in the G7, but as well developing systems, e.g. in the BRICS [24], and fairly underdeveloped ones, e.g. in the Sub-Saharan Africa. Some NFSs underwent decades of stagnation and are now developing rapidly, e.g. in the CEECs.

Governments, along with the national financial authorities, are also important constituents of the financial systems. They can act as prime borrowers in course of recessions or major infrastructural projects, but can equally act as key investors, by acquiring or operating large trust funds on behalf of population (Allen & Gale, 2001). More importantly, governmental and/or national authorities provide invaluable architecture for the efficient functioning of financial systems. NFSs differ strongly in the extent of the governmental involvement in functioning of financial institutions and markets. In some countries state-owned financial institutions dominate the financial system. For example, in China, four large state owned banks make the core

of the banking system, while financial markets are not even comparable in importance (Allen, Qian, & Qian, 2007)[25]. Large state owned banks are also a common feature in the African financial systems (Allen, Otchere, & Senbet, 2011). In a great number of these economies, banks invest heavily in government securities, often following specific orders of governments themselves. This is troublesome since it reflects a highly dysfunctional banking intermediation which disregards the provision of private credit in favor of safer government securities. On the opposite end, some governments prioritize the performance of financial systems above all other sectors of the economy. They allow for low taxation rates and great freedoms of operations of financial institutions and markets in order to attract foreign capital. Such are the financial systems of the offshore economies, e.g. Bahrain, Cayman Islands, Singapore and Switzerland. In the mid-range are the advanced and newly industrialized economies, in which the financial liberalization is constrained heavily by the risks incurred by the real economy.

In continuation, financial systems differ with respect to how centralized is the regulation and supervision of the system. Regulation refers to the rules that govern the behavior of financial intermediaries, and supervision refers to monitoring and enforcement of these rules[26] (CEA , 2009). In some countries, like in Germany, there is currently one national regulator for all the providers of financial services, the Federal Financial Supervisory Authority (BaFin). In others, like in the U.S., there

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[24] BRICS – international political organization of leading emerging countries Brazil, Russia, India, China, South Africa

[25] China has a very strong 'Hybrid Sector', the subsystem which operates primarily through informal financial intermediation and various forms of coalitions between firms, investors and local governments. The sector involves all non-state, non-listed, privately owned firms or even firms partially owned by the local governments. This is the financial sector which contributes the most to the Chinese economic growth.
[26] regulation and supervision are not managed by the same authorities in all the countries

are a number of different bodies which work on the regulation and supervision of specific parts of the financial system: the Office of the Comptroller of the Currency (OCC), the Federal Reserve and the Federal Deposit Insurance Corporation (FDIC), to name a few (Singh, 2007). Regulation can also vary according to the scale at which it is imposed. It can be fully centralized at the national level, but it can also be almost entirely local. In practice there are even cases of mixed-scale regulation, where financial institutions can choose to comply with either local or national regulation. This is the case of the dual system in the U.S., but has as well been occurring in the EU since the early 1990s. Namely, the EC allowed for the branches of financial institutions operating in a fellow EU-economy to use the regulation established in their countries of origin. Mixed-scales regulation stimulates the competition among regulatory bodies which can have both positive and adverse effects on the overall financial system (Wilcox, 2005). Additionally, regulators can be independent institutions within the NFS[27], which is the case in OECD countries, or they can be a part of the government itself, e.g. the Russian Federal Financial Markets Service.

Finally, NFSs can differ in the fundamental ideologies which back their legal systems and direct governance. In that sense, there is a standard division between the civil and common law foundations (Ergungor, 2004). The former implies the need for a codified framework of law in which any regulation needed by the community can be readily found. This framework has its origins in continental Europe and is in the basis of the legal systems, with variations, in over 150 different countries worldwide. The latter is the property of Anglo-American judicial system, with the underlying idea that laws should be formulated only

when social conditions deem them necessary. Ergungor argues that banking systems tend to emerge as dominant financial structure and primary contract enforcers in the countries with civil-law fundamentals, because of the lower efficiency of their courts and lower flexibility in interpretation and creation of new rules. Analogously, he argues that providing common-law courts with more detailed creditor and shareholder protection laws fosters the development of financial markets. The financial development of the Islamic emerging economies brought about deeper discussions on the application of Shari'ah laws in defining financial relations. Islamic financial systems have two distinct features, the first being the prohibition of payment of interests, and therefore effectively the elimination of debt and the opportunities to create leverage in the system. The second is that its financial instruments promote more equitable risk sharing. Islamic financial practices are dominant in some Islamic economies like Iran, while generally they tent to coexist in parallel with one of the aforementioned practices (Iqbal, 2011).

The basis for the differences between NFSs has been discussed at great extent in the economic literature (Allen & Gale, 2001; Levine, 2002; Champonnois, 2006; Allen, Qian, & Qian, 2007; BIS Monetary and Economic Department, 2007; Farrell & Lund, 2006). The major question is whether these differences necessarily impede the international consolidation of the NFSs. Also debated is whether differentiation is a consequence of the intrinsically diverse needs of the national economies or is its role to stimulate one economy's competitiveness in terms of the provision of financial services. Globally, the principal question is whether NFSs perform different functions in themselves, or do they represent different ways of addressing the same functional demands, and if so, which design is performing the best.

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[27] or can be a part of another (independent) institution, e.g. a central bank

- Unified Structure

The GFS arises as the infrastructure that connects the NFSs into one dynamic entity. It is a space for interactions among the systems' agents, weighted by their relative geo-physical positioning. The GFS allows for both private and public agents from one NFS to extend their operations and exploit greater international markets for financial services. Furthermore, the GFS allows for integration of individual (national) financial structures into larger, supranational formations. Institutions can integrate through mergers and acquisitions within and across borders, and create international institutions that operate primarily on the GFS. Equally so, markets can be integrated into greater international platforms for agents' interactions.

Because of its scale and far reach, the GFS is an essential infrastructure for the transfer of financial aid from donor nations and institutions to economies in need (Claessens, Cassimon, & Van Campenhout, 2010). The same properties of the GFS make it essential for the world scale criminal activities such as money laundering and terrorism financing[28] (IMF, 2001). Finally, the GFS allows for and motivates the existence of supranational authorities that regulate and supervise financial activities on wider regional and global levels.
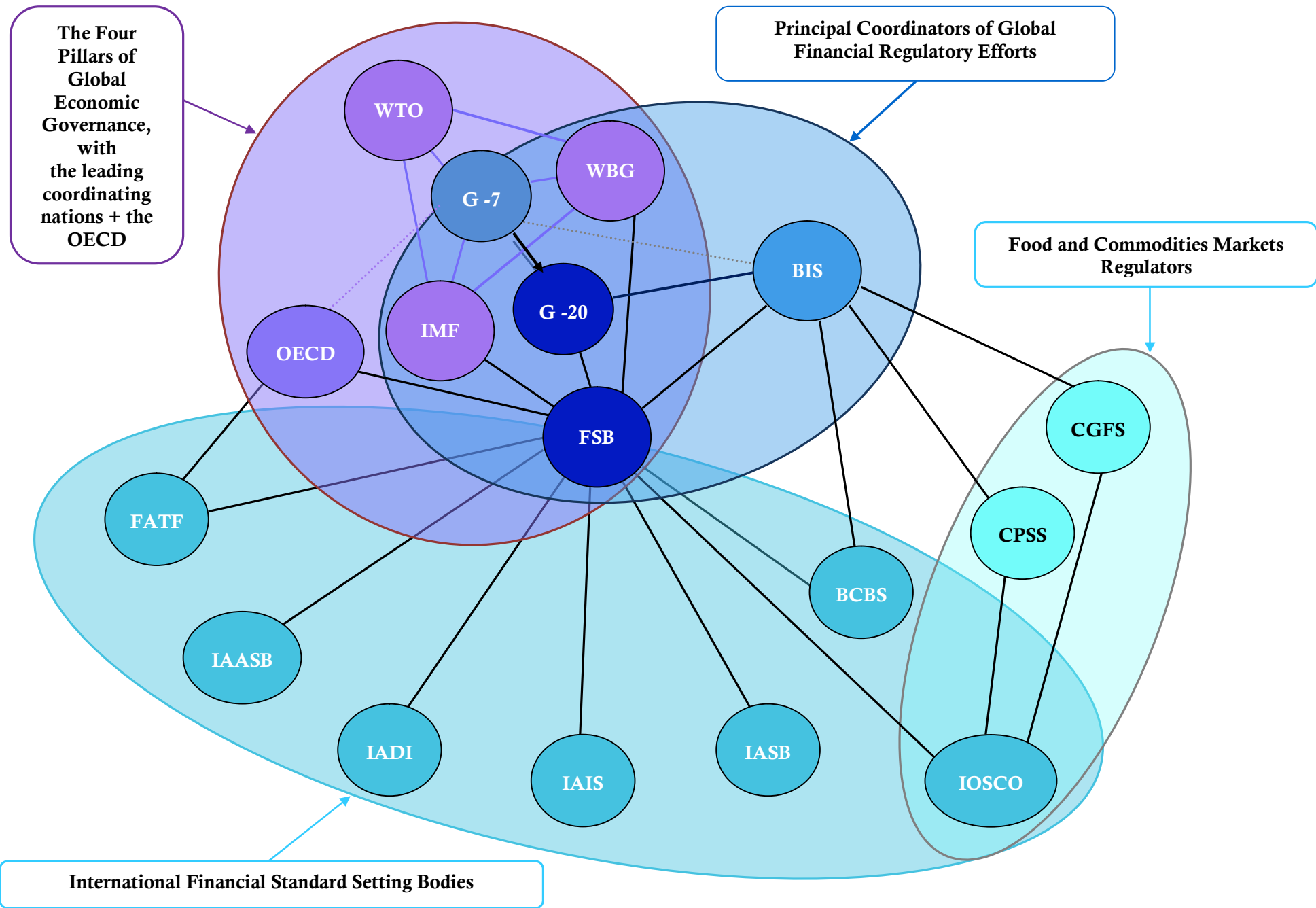
The established supranational authorities aim to promote international cooperation, to identify and to inform of best practices, and, consequently, to stimulate national authorities to endorse them. None of them, however, have the explicit power to enforce a set of regulation upon national authorities. An important characteristic of the existing supranational authorities is their organizational

fragmentation: numerous organizations coordinate specific aspects of global finances but there is no coordinating institution with an authority over all of these organizations.

In that fashion, the International Monetary Fund (IMF) has responsibility for developing and monitoring compliance with the macroeconomic policy standards and the data transparency standards. It also has a mandate to secure financial stability and the functionality of the international monetary system (IMS) [29]. The Bank for International Settlements (BIS) aids central banks in their pursuit of monetary and financial stability, but serves as well as a bank for central banks and fosters their international collaboration. The World Bank Group (WBG) has responsibility for institutional and market infrastructure. The Basel Committee on Banking Supervision (BCBS) has responsibility for international coordination of banking standards. The International Association of Insurance Supervisors (IAIS) is responsible for strengthening the supervision of cross-border insurance firms. The International Organization of Securities Commission (IOSCO) is to set a global forum for standardization on exchange trade, OTC markets, clearing and settlement systems. It is also to account for the risks posed by the participants in the markets for securities. The Financial Action Task Force (FATF) is responsible for addressing the risk of money laundering and terrorist financing. The Financial Stability Board (FSB) has the responsibility to supervise and review systemically important institutions, issue early warnings for crisis events and mediate the cross-border crisis management. To some extent the FSB coordinates activities of other institutions, in order to insure system's functionality (Oatley & Winecoff, 2012; FSA, 2010). An attempt to represent the relations in the FSB centered coordination is given bellow.

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[28] there is an argument that combating terrorist financing through financial regulation might actually be pointless, since terrorism is often funded by clean money (Tsingou, 2010)

[29] for detailed discussion on the IMS, check section 2.4.

The Four Pillars of Global Economic Governance, with the leading coordinating nations + the OECD

Principal Coordinators of Global Financial Regulatory Efforts

Food and Commodities Markets Regulators

WTO

WBG

G -7

BIS

G -20

IMF

OECD

FSB

FATF

CGFS

CPSS

BCBS

IAASB

IADI

IAIS

IASB

IOSCO

International Financial Standard Setting Bodies

Schema is a tentative representation of the FSB-centred view of major supranational authorities and their coordination. Institutions not covered in the preceding text, given in alphabetical order: the Committee on Payments and Settlements Systems (CPSS), the Committee on the Global Financial System (CGFS), the International Auditing and Assurance Standards Board (IAASB), the International Association of Deposit Insurers (IADI) , the International Accounting Standards Board (IASB), the Organization for Economic Co-operation and Development (OECD), the World Trade Organization (WTO) . The four pillars of the global economic governance are: the IMF, the WBG, the WTO and the FSB itself, as the newly added pillar

- Agents

The principal agents of the GFS can be split into three respective categories: the financial infrastructure sector[30], the official/public sector and the private sector (Masera, 2010), as given in Figure 1. The financial infrastructure sector includes the following agents:

- financial regulators and supervisors[31], at all scales, e.g. special regulatory bodies, like the FSA and the BaFin, divisions of national finance ministries, macro- and microprudential supervisory bodies
- financial intelligence units (FIUs)
- financial market utilities systems, i.e. payment, clearing and settlement systems of institutions
- signaling agents, such as the internationally operating credit rating agencies (CRAs), e.g. Standard and Poor's (S&P) and Moody's, or internationally acclaimed financial media, e.g. the Financial Times
- institutions belonging to the financial aid architecture, e.g. regional providers of micro-financing[32]

The official/public[33] sector includes the following agents:

- global financial institutions, e.g. the IMF, the BIS and the FSB
- regional alliances, institutions, and funds, e.g. the EMU with the European Central Bank (ECB), Chiang Mai Initiative with the Asian Bond Fund, MERCOSUL with the Banco del Sur in South America,
- national/governmental institutions and agencies such as central banks, treasuries, and sovereign wealth funds (SWFs)

The main agents of the private sector are:

- internationally operating regulated private institutions[34], e.g. banks, along with their representative unions, e.g. the Institute of International Finance (IIF).
- the less regulated shadow banking system, along with the long-term asset managers and non-official guaranty providers, e.g. investment banks, hedge funds[35] and SIVs (Financial Times, 2009)

The latter have for long been excluded from structural analyses because of the fact that they are not as vital for the payments systems.

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[30] can be both private and public

[31] a distinction is made here between purely regulating bodies and official/public bodies. While many official/public agents, e.g. central banks, can perform regulatory functions as well, purely regulatory agencies, e.g. the FSA, perform no other functions but regulation (analogous for supervision). In majority of the cases regulators are simultaneously the supervisors

[32] consistent evidence for inappropriateness of top-down approaches to provision of financial aid led the WBG to fundamentally change the approach to the problem, and place social foundations in front of the economic growth related goals. The new market-oriented principles testify the recognition of the donor nations that the poor need reliable access to banking systems. Opposite of its initial intention, this lead to the encouragement of the idea that "the poor are bankable" and many large investors now see microfinance as an important investment opportunity (Young, 2010). This is an interesting example for a transformation of an infrastructural subsystem of the GFS into a private sector dominated part of the GFS

[33] here it is written both official and public, as the general term 'public' is not always adequate. In the U.S. for example, the FED, which performs the role of the national central bank has both public and private aspects to it

[34] a relevant point to discuss here is the treatment of individual investors which have considerable impact on the markets, e.g. Warren Buffet and George Soros. The importance of individual investors has already been emphasized (Coval, Hirshleifer, & Shumway, 2005), but at this point, we choose to focus exclusively on institutions

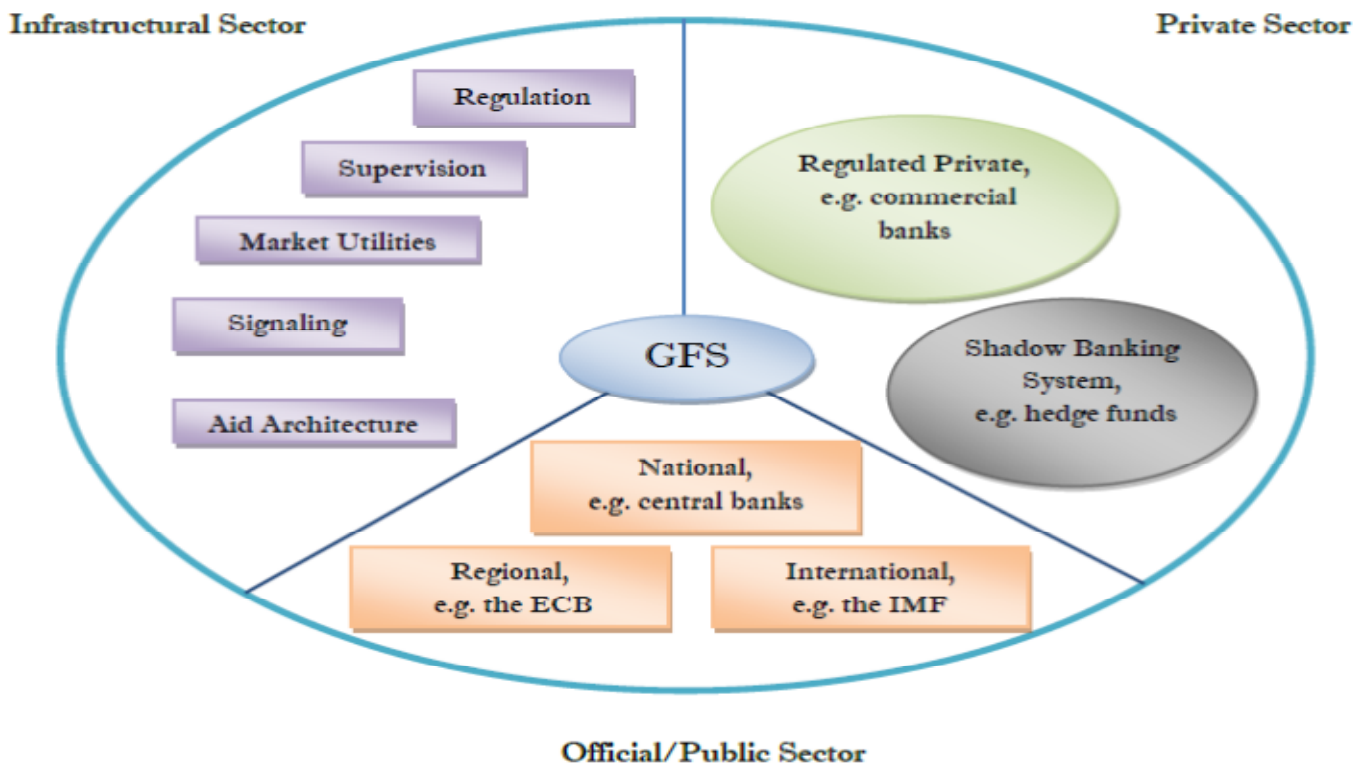[35] hedge funds are to be regulated in Europe (BBC, 2010)

Figure 1: The scheme representing the main agents of the GFS, separated in three categories: Financial Infrastructure Sector (both private and state owned), Public Financial Sector and Official/Public Sector

- Development Directions

The dynamics of interactions among all the aforementioned agents are highly complex and are perpetually affecting the structure and the organization of the GFS. As a relevant example, post-GFC analyses noted that the complexity of the system's structure had been steadily increasing in the early 2000s. The five aspects that contributed the most to this effect were found to be: 1) the increase in scope of activities of financial institutions through the spread of universal banking in the U.S. [36]; 2) the increase in scale of financial intermediaries, both in terms of assets owned and in terms of geographical span of activities; 3) financial innovation, i.e. introduction of alternative financial instruments (BIS, 2011); 4) growth of the international SBSs; 5) the separation of the lending decision from holding and management of related risks through securitization (CEA , 2009). All of the

five listed aspects are consequences of the unprecedented technological development over the course of past three decades. Technological and, in particular, computational advances are among the principal driving forces for the GFS's modern development.

The trends in the GFS's development are not always favorable and may create harmful disturbances. A safe and efficient financial infrastructure is to foster financial stability and is crucial for successful functioning of the integrated financial markets. On the other hand, weak infrastructure results in major disruptions to smooth market operation and is directly exposing market participants to risks (SBP, 2005). It is therefore important to understand the system's structure and directions in development, as this is the basis for detection and improvement upon its inefficiencies. It is also a starting point for prevention of defaults and collapses.

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[36] perform both commercial and investment banking services

The directions in the development of the GFS are laid out primarily through the G7 and/or G20[37] agendas in terms of recommendations for the international financial architecture (IFA) (Baker, 2010). The IFA, in broad terms, refers to the framework and the sets of measures which aim at crisis prevention and management of the GFS, but recently, as well, of the NFSs (WBG, 2011). A well defined IFA balances the effectiveness of decision making, particularly in the hardships of crises, with the legitimacy for incorporation of various conflicting interests into system-governing policies (Underhill, Blom, & Mügge, 2010).

The political rooting of the IFA makes the character of this set of measure responsive rather than preventive. Accordingly, in calm periods anti-crisis regulation falls down in priority on the G7/G20's tight agenda. The latter is consistent with the fact that, regardless the level of financial integration, the political accountability remains strictly local. Responsive attitude is observed as well at the lower levels of financial governance. National authorities are often deemed too slow to adjust to the fast evolution of financial markets (Helleiner & Pagliari, 2010). Responsiveness additionally implies a critical dependence of the IFA on the type of crisis which precedes the update. This is reflected in the Basel Accord related reforms of the IFA.

Up until the GFC, the G7 had almost exclusive authorship over the IFA designs, implying a rather imbalanced input side. Adding to the imbalance was the fact that, either through representative unions, like the IIF, or individually, a number of G-7 based

private institutions had a considerably larger take on the previous IFA's designs than a great number of national economies that were expected to apply it (Claessens & Underhill, 2010).

On the other side, general market incentives appear as important as the ideology behind the IFA. This is consistent with prioritizing market functionality over national interests under financial integrations. A number of markets exist in a purely international setting, with little or no regulation imposed upon them, and with the SBS agents as their principal financial intermediaries. These markets create arbitrage options and act as source of competition to the agents within the NFSs. The IFA should thus be consolidated with the market incentives, as one of its principal constraints. An effect that is making consolidation difficult is the intensification of financial signaling. The signaling infrastructure, prompted by the overall intensification of information transfer, has deepened considerably its interactions with the financial markets. The responsive attitude of the regulators is thus additionally challenged by the need for swift reactions to the developments of which the wider markets are being promptly informed about.

Additional goals of the IFA include stimulating poverty relief and economic growth through efficient distribution of financial aid. Moreover, the IFA has to address the abuses of financial infrastructure in favor of money laundering (WBG, 2008; WBG, 2001). The IFA is thus to stimulate the efficiency in global financial interactions at the expense of capacity to monitor both stability and the abuses of the GFS's infrastructure. Currently, the focus lies primarily on the challenges posed by the international interdependence of financial institutions and on the necessity to prudentially manage systemic risks (Cartapanis & Herland, 2001; Eichengreen B. , 2009).

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[37] G7 members are the finance ministers of: Canada, France, Germany, Italy, Japan, United Kingdom and the United States; G20 members are both the finance ministers and the central bank governors of the G7 countries, the EU and the leading economies of Asia (China, India, Indonesia, South Korea, Russia), Africa (South Africa), the Middle East (Turkey, Saudi Arabia), Latin America (Mexico, Brazil, Argentina) and Australia.

Summary	National Financial Systems (NFSs)									
Functions	conduit for savings into investments, wealth storage, credit and liquidity provision, payment utilities, risk management, policy channel									

Subsystems	**by instruments →**		**non-transferables**		**securities**			**derivatives**		
					short	**medium**	**long**			
	structures involved →		classical banking systems		the whole of NFS					

Components	**financial markets**						**financial institutions**			
role	platforms for direct financial interactions						intermediation			architecture
types	capital	credit		FX	commodity	insurance	depository	non-depository	SBS	institutions that do not participate
primary	bonds and shares	liquidity	derivatives	currencies	precious metals	risk	commercial banks	mutual funds	investment banks	directly in the financial instruments' trade
other comparisons	depth, instrument's origin, level of parties involved, manner of trading						level with respect to the NFS, regulation imposed			
economic functions	price determination						settlements of payments/clearing			
							smoothening of asymmetry of information in markets			
	provision of liquidity						credit transformation			
							liquidity transformation			
	reduction of transaction costs						risk transformation			
							maturity transformation			

Differentiation

by components		**by involvement of gov.**			**by relative market shares**			**by the level of development**		
market-oriented	bank-based				credit dominated	capital dominated	mixed	high	emerging	low
transparency, firewalls, competition	intertemporal smoothing, lack of competition	strong	mid-range	weak						
U.S.	Germany	China	U.S.	OFCs	Europe	U.S.	Japan	G-7	BRIC	S.S. Africa

by regulation								
institutional organization		geographical organization					independent	
centralized	decentralized	nationwide		local		mixed	yes	not
Germany	U.S.	majority of economies		Hong Kong in China		U.S., EU	OECD countries	Russia

Global Financial System			
Functions	integrates NFSs, extends operations and opportunities of all financial agents, facilitates convergence, provides financial aid		
		examples	
Components	**NFSs**	as specified above	
	supranational structures	EU, OECD, CFA zone, Chiang Mai Initiative	
	global structures	financial aid architecture, FATF, BCBS, IMS	
Agents	**financial infrastructure**	regulation & supervision	special bodies (FSA), divisions of finance ministries/central banks
		financial intelligence	AUSTRAC (Australia), FinCEN (USA), SOCA (U.K.)
		market utilities systems	payment, clearing and settlements systems of institutions
		signaling agents	CRAs, financial media, market indices
		financial aid	regional providers of micro-financing
	official/public sector	national	central banks, finance ministries, SWFs
		regional	ECB, Asian Bond Fund, Banco del Sur
		global	BIS, BCBS, FATF, FSB, IAIS, IMF, IOSCO,WBG
	private sector	international private institutions (regulated)	banks, IIF
		shadow banking (unregulated)	investment banks, mutual funds, hedge funds, SIVs
Principal Issues	management under increasing complexity (interdependences, systemic risk, regulation)	**Development Directions Dependent on**	technology
	treatment of the SBS		G7/G20
	financial innovation		internationally active private institutions
	evolving role of financial signaling		market incentives
	imbalance between the input and output side of the IFA		crisis events themselves

2.2. Financial Integration

Financial integration is a process though which different parts of a single NFS or of a group of different NFSs intensify mutual interactions towards eventually becoming a single financial structure. In this inquiry however, the term financial integration refers to the previously described tendency for integrations to occur or to be intensified, simultaneously, in a great number of locations around the world. The individual integration processes do not, however, need to occur at the same pace. This is to say that, although system-wide in nature, the process of financial integration is not necessarily homogeneous. In addition, there is no single central authority or a group of authorities which supervise, coordinate or govern this process. Rather, it is motivated by the occurrences and incentives in individual markets and opportunities created through financial interaction and innovation. The outcome is consequently dependent on the actions of and relations between numerous different agents in the GFS. In that sense, financial globalization and financial regionalization are both treated as potential outcomes of international financial integration process, while financial openness and financial liberalization are treated as preconditions that are stimulative to financial integration. Effectively, unless specified otherwise, financial integration process is considered by this inquiry to be a single heterogeneous systemic process on the GFS.

- Integration of Financial Markets

Financial markets are traditionally at the core of any discussion about the financial integration. They are the parts of the financial systems where the integration process is usually initiated. Market incentives lead to the convergence in terms of prices, quality in service provision and eventually, the convergence in terms of regulation. Incentives are particularly strong when costs related to effective distance and regulation are low. Otherwise, financial innovation probes, gradually, the barriers to financial interactions. Crossborder ownership and service provision stimulate further this process, as well as the crossborder inquiry about services (EC IMS DG, 2005).

The original stimuli for the ongoing financial integration process can be traced back to financial innovation that occurred more than half a century ago. Innovation was driven by the barriers to international financial activity imposed under the Bretton Woods system, which favored trade over financial integration. In terms of institutions, the innovations included creation of money market funds and return of mutual funds, while in terms of structures they included creation of international markets for new sets of financial instruments, reestablishment of international financial centers (IFCs) and of offshore financial centers (OFCs). Trigger events for the integration process were the fall of the Bretton Woods system, as the ruling IMS, and the consequent liberalization of the capital flows between national economies. The main catalysts of the process, however, were the cost reductions achieved through advancement of technology and the trend towards securitization (Herring, 1994; Gordon, 1995). Finally, the contribution of the integration process to the increase in the overall risk for system's functioning is the key impedance towards future integration.

- Motivation: Capital Controls

Capital controls are policies that aim to influence the volume, composition, or allocation of cross-border private capital flows (Steinherr, Cisotta, Klär, & Šehović, 2006). The most common measures involve controls on inflows and outflows of capital, tax-based controls and quantitative controls. Capital outflow controls are used typically to limit the risk of capital flight and ensuing destabilization of national economies. Conversely, restrictions on capital inflows are designed to level the overall volume of capital pouring into an economy, in order to account for inflationary pressures, market instabilities and financial bubbles. Tax-based controls can be imposed in form of unreimbursable reserve requirements, which decrease progressively as long as capital remains within the economy. Quantitative controls involve measures such as quotas, license requirements and outright bans on a particular type of investment or for a population of investors.

Steinherr et al. point out that, financial regulation measures can act too as restrictions on cross-border capital movements. Examples of these measures involve the ratio of foreign currency liabilities to equity requirements and other elements of 'prudential financial regulation'. In that sense, controls persist even in the modern developed economies. The authors conclude that for more optimal effects the authorities should consider replacing the remaining administrative controls with (prudential) financial regulation. Moreover, if there is an argument for implementation of controls, then simple, transparent and adaptive control measures administered by a single authority are the most effective option.

Before the 1971, under the Bretton Woods system, the flows of capital were strongly limited. This was the principal Keynesian input into the system's design. Keynes envisioned the wide ranging capital controls as a permanent and necessary feature of the IMS, the first line of defense of the fixed exchange rates regime (Neely, 1999). Current account convertibility was allowed once political conditions were deemed sufficiently stable. Essentially this meant that currency convertibility under the Bretton-Woods system was reserved for the needs of international trade in goods and services, while it was not applicable to investments and borrowings (Skidelsky, 2005).

Not long after their inauguration, capital controls were challenged by financial innovation, primarily by the development of the Eurodollar market. In general terms, the Eurodollar[38] market is the market for deposit liabilities which are denominated in the U.S. dollars at the banks that are located outside of the U.S., and are therefore subject to different, often looser, regulation compared to the similar deposits held within the U.S. (Friedman, 1969). The Eurodollar market was met with instantly high demand. On one side it created a way to go about the minimal required reserves on deposits, the maximal ceilings on the rates of interest and the exchange controls, all prescribed by the U.S. financial authorities. On the other side, it allowed the citizens of the USSR and the other socialist economies to keep balances in the U.S. dollars that were not subject to the U.S. government controls. The latter was instrumental in the wake of the Cold War.

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[38] the name comes from the fact that it were European banks that initiated the market activity, and does not imply any other specific attachment of the market to Europe or the euro for that matter. In fact, it became a common denomination to add 'euro' before the name of any foreign currency in which deposits are held outside of the country of issuance, to denote the market for those deposit liabilities, e.g. the euroyen

The demand was initially met by the City of London[39]. In a revolutionary maneuver for the era, the City pioneered the Eurodollar market by becoming an offshore financial center. Namely, the British state placed all transactions in foreign currencies, apart from the exchange rate and reserve regulation, outside the oversight of the British authorities. Since the transactions were taking place within the British territorial boundaries, they were put effectively outside the regulation of any state. The Eurodollar market thus created a whole new type of money, which was held and operated with outside any national banking regulation and outside of the system of state sovereignty (Fichtner, 2004). Simultaneously, the Eurodollar market created the momentum that allowed the City of London to reestablish itself as the major IFC after the WWII.

The success of Eurodollar market was immediate. Its starting value was estimated at $ 1 billion in the 1950s and it rose close to $ 4 trillion in the 1988 (Windecker, 1993; Carbaugh, 2008). With the average deposits estimated at millions of U.S. dollars and a maturity of less than six months, the

market was accessible only to financial institutions and the wealthiest individuals. Others gained access through a subsequent financial innovation – the money market funds[40], i.e. by pooling individual investments into larger, common funds. This essentially meant creation of an entire set of financial institutions within the unregulated markets and a gradual revival of shadow banking.

Meanwhile, OFCs started proliferating worldwide. In general terms, offshore financial centers are jurisdictions that, due to their permissive regulation, oversee a disproportionate level of financial activity by non-residents (Rose & Spiegel, 2007). In a narrower, and commonly referred to, sense OFCs are identified with tax havens. Tax havens are countries and territories which have adjusted their tax legislation to attract branches and subsidiaries of financial institutions based in heavy-taxed industrial nations (Starchild, 1993). Next to offering competitive taxation, common features of the OFCs include the high level of secrecy employed by the institutions handling the funds, little or no restrictions upon financial transactions, effective communications infrastructure and a particular economic or political background. Most of the OFCs are ex-colonial or special-status territories of one of the major European economies. They are primarily islands in relative vicinity to the major 'on-shore' nations, but include as well some continental economies[41].

In 1960s and 1970s both traditional and newly emerging OFCs challenged strongly the 'onshore' industrial ones by creating options for arbitrage and

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[39] in 1955, the Midland Bank (modern HSBC) explored the interest arbitrage presented by a tight monetary policy and the relaxation of controls on the forward exchange market, in search for more affordable sources of liquidity. Namely, by offering a slightly higher interest for short-term U.S. dollar deposits compared to the one prescribed as the maximal by the U.S. authorities, and consequently selling dollar spots for sterling and buying them back at a fixed premium, Midland was effectively obtaining sterling at a lower interest rate than the one given by the Bank of England, and was simultaneously attracting new customers. The innovation benefited from the external convertibility of the sterling and the rising supply of the U.S. dollar, as the U.S. deficits widened. The customers started to include other central banks in Europe and American multinational companies that looked for a profitable employment of their surplus dollar balances. Commitment of the British authorities to external sterling convertibility on one side, and the aim to support profitable business in London on the other, allowed for this movement to spread and to become a common practice in the City. (Schenk, 1998).

[40] an investment fund that holds the objective to earn interest for shareholders while maintaining a net asset value of $1 per share

[41] Andorra, Austria, Bahrain, Belgium, Costa Rice, Israel, Lebanon, Liberia, Liechtenstein, Luxembourg, Monaco, Panama, San Marino, Switzerland, the Netherlands, the United Arab Emirates, to name some (see Figure 3)

tax avoidance. Following the example of London, Singapore launched its Asian Dollar Market and Asian Currency Units in 1968, creating the East Asian alternative to Eurodollars. In Europe Luxemburg, the Channel Islands and the Isle of Man began attracting investors from Germany, France and Belgium with competitive taxation and banking secrecy rules. In the Middle East, Bahrain analogously started serving as the collection center for the oil generated surpluses of the wider region. Finally, equivalent roles were pursued by Bahamas and the Cayman Islands in the Western Hemisphere (IMF, 2000).

The Eurodollar market and the new OFCs are therefore revolutionary structural modifications for the development of the contemporary GFS. They cleared the path for new financial instruments to serve as means of international allocation of capital, even under capital controls. They profoundly disturbed the NFSs and acted as principal motivators for reintegration and liberalization. Swanson notes that already in the late 1970s the structures acted strongly towards the reduction of independence of the U.S. financial system. The strong evidence of feedback effects between offshore and onshore markets was suggestive of the inability of the U.S. to fully control their economy (Swanson, 1987).

The developments did not only challenge the national regulators with arbitrage options, but they pointed out intrinsic distortions associated with maintaining capital controls. Namely, authorities need considerable resources to assure the effectiveness of controls, while, equally, the private sector invests heavily to detect loopholes and arbitrage options. The controls are thus stimulating a profoundly inefficient allocation of resources. The realization of this effect caused a gradual change in the mainstream economic theories. Capital controls

started to be seen as overall more harmful than beneficial. This came in spite the evidence from the first globalization era that high international capital mobility could stimulate the occurrence of financial crises (Reinhart & Rogoff, 2009).

The 1971 fall of the Bretton-Woods system brought the abandonment of Keynesian in favor of neoliberal economics and countries began to reinstall the capital account convertibility[42]. Capital controls were first abolished in the U.S., Canada and Switzerland, by 1974, and in the U.K., by 1979. Other advanced economies and some emerging countries followed in the course of 1980s and 1990s (Gordon, 1995). Moreover, many national financial centers went through internationalization. A number of traits of the OFCs[43] were replicated and installed at the cores of NFSs as a response to international competition. Accordingly, in 1981 the U.S. established the International Banking Facilities in the major U.S. cities, and, soon after, Japan created the Japanese Offshore Market (IMF, 2000). National financial centers went through competitive deregulation, aiming to attract more representations of financial intermediaries. As a result, the international financial centers (IFCs) emerged as an essential structural characteristic of the GFS. The financial activity in the IFCs [44] is considerably stronger than in the rest of the surrounding NFSs or wider regional sections of the GFS[45]. The web of

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[42] convertibility of local financial assets into foreign ones and vice versa at market determined rates of exchange

[43] with the exception of tax rates

[44] traditionally leaders include London, New York City, Tokyo, Hong Kong, Singapore, Zurich and Geneva. The new, high performing IFCs include Shanghai, Chicago, Sydney, Toronto and Frankfurt (Long Finance, 2011).

[45] it is a trait of a developed and financially integrated economy to have one or more financial centres on its territory. The main reason is that high financial activity requires strong, concentrated, infrastructure that will support it. This includes competitive regulatory, supervisory and tax regimes, rule of law, high quality human capital, best telecommunications and IT capacities, deep liquid and sophisticated capital market and

the IFCs accounts for the major share of financial flows within the GFS (von Peter, 2007; IMF, 2011d).

From 1980 until 2009, the period also known as the Washington Consensus, developed countries agreed that capital controls should be avoided except in the case of crisis events. The principal assumption under the consensus was that free flow of capital along with the existing interest rates differentials would direct capital where it was needed the most and where it could obtain the highest yield. This would increase the effectiveness of international resource allocation. It would also widen the opportunities for both investors and borrowers, not only regarding capital allocation but risk diversification as well (Steinherr, Cisotta, Klär, & Šehović, 2006).

Events that followed the liberalization of capital flows in the emerging economies challenged this trend. Namely, experience showed that capital account openness can reinforce negative results already present in the emerging economies. Additionally, the events pointed out disabling effects of information inefficiencies in financial markets, particularly of the asymmetry of information and moral hazards (Steinherr, Cisotta, Klär, & Šehović, 2006).

Asian financial crisis of 1997-8 and its repercussions onto the GFS in particular, question the incentives for further liberalization. Steinherr et al. argue that while the commonly acknowledged macroeconomic contributors[46] to instabilities all existed in the affected economies, they do not explain why crisis avoided some of the equally problematic countries. According to Stienherr et al. it is the persistence of capital controls or their swift reestablishment that protected the economies like China, India, and Malaysia from the turmoil. Consequent lack of faith in the liberalization in developing countries was reflected in their de facto opposition to the Basel II reforms (Helleiner & Pagliari, 2010). Proposition remained strong in developed economies up until the GFC. The crisis brought the unofficial end of the Washington Consensus's implementation. The IMF, the WBG and the ADB all recommended some forms of capital controls to the exposed economies[47] (IMF, 2011f; Dickie, 2010; Yong & Seo, 2010). The IMF insisted, however, that capital controls should not be used as easier alternatives to more challenging economic reforms destined to address the very roots of the problems (Ostry, et al., 2011; Habermeier, Kokenyne, & Baba, 2011).
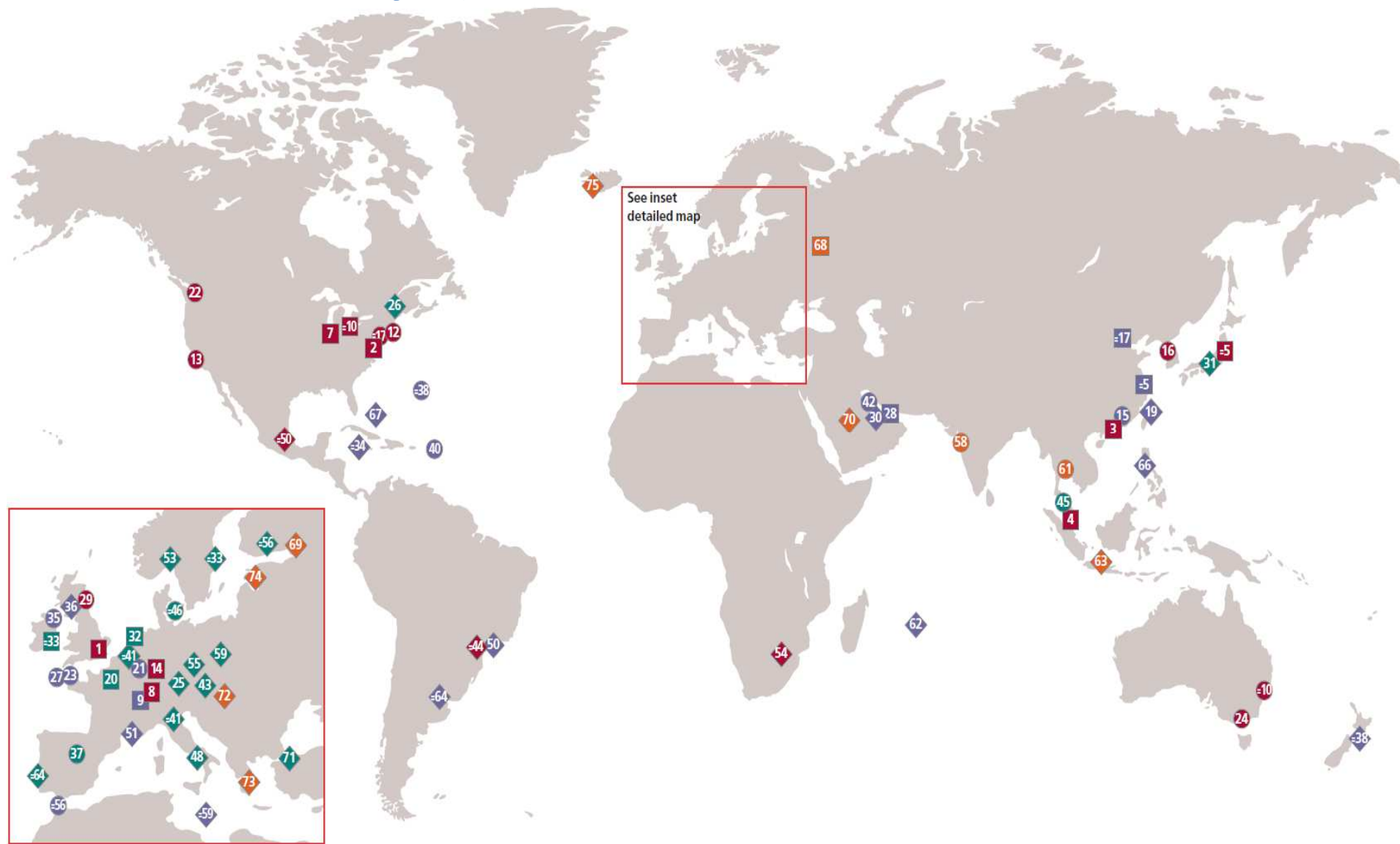
As for the IFA is concerned, G20 have agreed upon a global adaptation of macroprudential policies, as well as upon granting freedom to developing countries to deploy more capital controls than advised in the IMF guidelines[48]. With all the listed developments, the impression is that financial integration process is slowing down radically[49]. However, in December 2011, Chinese securities regulator opened the national equities market to foreign investors holding the Chinese renminbi (Rabinovitch, 2011). Not long after The People's Bank of China announced a three step plan for the liberalization of capital controls (Rabinovitch & Cookson, 2012). This is an important development that could introduce a new chapter in the financial integration process.   .

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other settings which allow for international financial business to be conducted profitably, easily and efficiently (Sanyal, 2007; Park Y. , 2011).

[46] weak macroeconomic fundamentals, inadequate supervision, lack of transparency and government guarantees that encourage risk taking

[47] starting with Iceland, in its national financial crisis
[48] 2009 G-20 Pittsburgh summit & 2011 G-20 Cannes summit
[49] the ongoing ESDC, in particular, has a negative impact on the overall process

Figure 2 The given figure is adopted from the Long Finance Financial Centers Index. It shows the 100 most important IFCs in the world, ranked by their annual performance (1-100), by their depth and the broadness of the spectrum of services provided (bordo – broad and deep, green – broad, purple – deep, orange – emerging), and finally by the level at which they provide services (squares – global, circles – transnational, reversed squares – local, regional). Only 20 years ago just a fraction of all these IFCs were internationally relevant. Now, all together their web of interactions is the backbone of the GFS. (Long Finance, 2011)

- Catalysts: Technology and Securitization

The costs of telecommunications, transportation and computation have dropped sharply with the technological revolution at the end of the 20th century. Accordingly, the costs of acquiring financial information, its further sharing, compiling, storing and analyzing, the costs of performing financial utilities and finally, the costs of system monitoring, all dropped sharply as well. As a consequence, domain of actions for literally all types of agents in the GFS expanded significantly. Providers, users and regulators of financial services now all have much wider set of options for arranging their respective businesses.

Technology stimulates financial innovation (Tufano, 2003). It facilitates the unbinding and recombination of financial instruments creating thus new ones that can fit almost any set of regulation. In case the instruments themselves are not fit to adopt, entire financial structures are. Namely, nowadays capital allocation between markets is sufficiently swift to accommodate efficient exploration of worldwide investment and savings conditions. To successfully redirect capital flows and to ensure the effectiveness of the new investments, financial intermediaries create or employ a network of subsidiaries in the new markets, at the expense of the previously established networks in less profitable ones. This implies that structures in the modern GFS are also highly adaptive. Furthermore, institutions are opting for strategic international positioning at the major IFCs to be able to actively pursue their interests. The representations consequently act as transmitters of financial instruments and practices, originated in a foreign financial environment and can thus influence the evolution of domestic markets (Herring, 1994). Finally, technology enhanced coordination between the IFCs, improving thus dramatically the efficiency of international financial markets. This is particularly the case of the global foreign exchange market[50]. Daily turnover there rose more than four-fold between 1992 and 2010, from approximately $800 billion to nearly $4 trillion (BIS, 2010)

Securitization is a process in which assets are pooled to be repackaged into interest-bearing securities (Jobst, 2008). Securitized products existed in their most fundamental form[51] since the 18th century, but starting with the 1970s the process gained a whole new momentum. Government sponsored enterprises (GSEs) in the U.S.[52], started pooling prime home mortgages and using them for issuance of securities. Until then the bulk of home mortgages was held by the banks and savings institutions. The GSEs' function was to enhance flows of credit in particular sectors of the economy, like agriculture or education. Moreover they were to improve the availability, decrease the cost of credit and to provide greater transparency for these flows. Effectively, securitization allowed advances in all but the last of these goals.

In its basic form a securitization process involves two steps. Firstly, a company having loans or other income-producing assets chooses the assets it will remove from its balance sheet and pool them into a reference portfolio. This portfolio is sold to an issuer, an institution specially set up adjacent to another financial institution to acquire pools of assets and facilitate their legal and accounting adjustment off balance sheets. In step two this institution issues marketable, interest-bearing securities which are further sold in capital markets to investors. Investors receive payments from a trustee account funded by the cash flows which are generated by the reference portfolio (Jobst, 2008). Securitization therefore is an alternative and

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[50] also known as the forex, the FX, the currency market
[51] covered bonds
[52] e.g. the Federal National Mortgage Association (FNMA, or Fannie Mae), Government National Mortgage Association (GNMA, or Ginnie Mae) and Federal Home Loan Mortgage Corporation (FHLMC, or Freddie Mac)

diversified source of finance based on the transfer of credit risk from issuers to investors.

Any type of asset with a stable flow can be structured into reference portfolios to support issuance of securities. Initially only mortgages were allowed to back securities. Following the technological revolution, however, securitization techniques for other assets were improved and securitization landscape expanded radically. As a result, more complex instruments such as asset-backed securities (ABSs) and collateralized debt obligations (CDOs) flooded the markets.

Securitization allowed for alleviation of credit constraints within national economies, particularly in the U.S. Furthermore, it placed the exposures with the entities that were more willing to accept and to manage risks, and it thus improved diversification options for all the involved agents. Issuers and investors benefited strongly from improved access to funds, market-based valuation and active management of assets and liabilities. Financial markets were growing deeper and securitization techniques became instrumental in provision of housing funding and consumer credit (IMF, 2009). Eventually, securitization acted to increase the availability of credit per capita and to reduce its cost (Gurusamy, 2009). By means of competition, it directed funds from banking systems into liquid securities. Structurally, this implies a radical shift from bank-based financial systems towards market-oriented ones. The IMF identifies securitization as a key characteristic of the modern financial environment (IMF, 2009).

Evolution of the securitization process, and innovative financial instruments that arose as its byproducts, led to the growth in cross-border financial holdings among developed economies (Lane & Milesi-Ferretti, 2008b). Innovation in financial instruments and services in one economy created demand in others, and stimulated overall development of the NFSs. Complemented with the activities at the OFCs, securitization became the most common arbitrage tool, and hence a source of competitive incentives both within and among national economies. Moreover, securitization facilitated large scale financial integration in advanced economies, particularly in the EU and the U.S. In many emerging economies securitization technologies have been instrumental support to the stable supply of funding. Governments pursued it to overcome credit constraints in individual sectors. For those economies that allowed capital account convertibility, this also implied an international extension of the base of investors.

The downside of securitization, in its modern form, is the opacity of the underlying claims for the issued instruments, due to their great complexity. The GFC showed that securitization can push the risk-taking capacity of the SBSs to its extremes. Institutions of the SBS are in constant demand for new assets to fill the expanding balance sheets and increase their leverage, and securitization process is invaluable in proving these assets (Shin, 2009). Too much securitization can however endanger the wider financial system with excessive risk taking. There is a strong pressure over the executives of SBS institutions to generate profit for individual investors, but the pooling gives them considerable power to direct the flows of capital. In majority of cases, however, executives retain limited responsibility for their actions[53], which causes moral hazard (Gordon, 1995). The hazard is greater in larger and more connected SBS institutions because of their systemic importance.

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[53] the principal penalty is being fired or forced to quit, while the consequences of their work can affect irreversibly entire economies or even substructures of the GFS

- Market Integration Levels

In an early discussion, Herring identifies five distinctive levels of financial market integration as reflected by the interest rates (Herring, 1994). His work is consistent with those of Frankel, McArthur, Lemmen and Eijffinger, reviewed by Fratzscher as the international macroeconomics-originated views on financial integration (Fratzscher, 2001). The lowest level of integration according to Herring is the integration of the offshore markets for a given asset (currency) to covered interest rate party.

The second level requires integration of offshore and onshore markets. Herring claims that developed countries reached this level of integration by 1993, as they essentially loosened capital control regulation[54]. At the level three Herring postulates that there should be frictionless capital mobility. Investors should perceive short- to medium-term fixed income assets insured against volatility in exchange rates as perfect substitutes. This essentially implies the elimination of the barriers between national markets, apart from the exchange rate risks. Herring perceives that, by the time of his analysis, the international financial integration has advanced to the third level in the developed economies. Level four, the uncovered interest rate parity, implies equality between the difference in nominal interest rates and the anticipated change in the exchange rates. At this level of integration the expected returns on investments in different currencies should be identical when measured in the same currency.

Herring sees the ultimate level of financial integration to be the one at which uncovered interest rate parity is coupled with the property that the expected change in exchange rate offsets the anticipated difference in inflation rates in both countries. This is known as the real interest rate parity. At this point capital flows level the real interest rates between all the integrated countries. Moreover, the nominal interest rate differential is equal to the anticipated differential in the inflation rates for any two integrated countries.

Fratzscher reviews as well the international finance approach to financial integration. The primary tool here is the capital asset pricing model, which is governed by the following equation:

$$E_{t-1}(r_{i,t}) = \lambda_w \beta_w + \lambda_d \beta_d \qquad (1)$$

Here $E_{t-1}(r_{i,t})$ is the expected return on the local portfolio i given the information up to time $t-1$. λs denote the market risk premiums, global and domestic, while βs denote the risk of the portfolio i relative to world/domestic market portfolio[55]. Full integration according to this model requires $\lambda_d = 0$, i.e. local portfolio pricing which is dependent only on the global conditions (Fratzscher, 2001).

In narrower terms, a market for a set of financial instruments and services is considered to be fully integrated if all its participants 1) face a single set of rules while operating with those instruments or services, 2) have equal access to them and 3) are not discriminated when they are active on the market (Baele, Ferrando, Hördahl, Krylova, & Monnet, 2004). This definition allows for an integrated financial market to 1) be independent of the underlying financial structures, 2) not create a fully frictionless intermediation, but rather reduce the asymmetries of it, 3) not categorize investors and borrowers at the entry, particularly not on the basis of their location of origin, 4) to allow for the law of one price to hold[56].

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[54] does not imply convergence in tax rates

[55] $\beta_{iw} = cov_{t-1}[r_{i,t}, r_{w,t}]/var_{t-1}[r_{i,t}]$, analogous for β_{id}
[56] equal pricing of the assets with identical returns and risks regardless of the place of their transaction.

	Level	Domestic Market (x)	Offshore Market		Foreign Market (*)
1	Common Interest Parity among Offshore Rates		$i_{ox} = fp + i_{o*}$		
2	Integration of Offshore and Onshore Markets	$i_x =$	i_{ox} $=$	i_{o*}	i_*
3	Covered Interest Rate Parity among National Rates		$i_x = fp + i_*$		
4	Uncovered Interest Rate Parity among National Rates		$i_x = sp' + i_*$		
5	Real Interest Rate Parity among National Rates	$r_x = i_x - \%\Delta P'_x$	$r_x - r_* = i_x - i_* + \%\Delta P_* - \%\Delta P_x$ $= 0$		$r_* = i_* - \%\Delta P'_*$

Table 1: The Levels of Financial Integration, adopted from Herring et al.: x and * denote domestic and foreign currency, i_{ox} and i_{o*} denote the rates for a deposit that matures in one year in offshore markets, when placed in domestic currency and when placed in a foreign currency, respectfully. i_x is the national interest rate in a country x, fp is the forward premium stated as the difference between x denoted price of a unit of foreign currency for spot delivery scaled by the spot price of foreign currency, sp' is the speculative premium stated as the expected x denoted price of a unit of foreign currency in one year less the actual x denoted price of a unit of foreign currency for spot delivery, scaled by the spot price of foreign currency, $\%\Delta P'$ is the anticipated annual percentage change in the price index of country x and r_x is the real (adjusted for inflation) interest rate in country x for one year maturity.

- Measuring Integration

In their addressing of financial markets integration in the Euro Area, Baele et al. propose three broad categories of measures. Two based on the law of one price, the so called price-based and news-based measures, and one based on quantities.

Price-based measures estimate discrepancies in pricing of assets caused by their geographical origin, and should account for the differences in estimates of risk factors. The latter particularly concerns filtering out the non-diversifiable, systematic risk from the asset pricing. The measures include: the cross-sectional dispersion of interest rates spreads, the beta convergence [57], and the degree of cross-border price/yield variation relative to the variability within individual countries.

News-based measures quantify the persisting friction arising from the asymmetry of information. The basic assumption here is that in better integrated areas the portfolios are well diversified and hence news of regional character is not likely to have as large impact on interest rates as the global news. These measures include primarily the estimates of the proportion of asset price changes that can be accounted for by factors affecting all the integrating nations. Quantity-based measures evaluate the frictional effects arising from the demand for and supply of investment opportunities. They include primarily the estimates of the volume of cross-border activities and of 'home bias' [58]. These measures are the more commonly used estimates of global financial integration.

[57] the speed at which markets/economies are integrating

[58] the tendency to invest more in domestic markets regardless of the yield and the risk estimates

Prasad et al. find the quantity-based measures that rely on actual capital flows to be the most suitable measures of one country's financial integration (Prasad, Rogoff, Wei, & Kose, 2003). They compare them with other type of de facto measures, such as the previously discussed price-based ones, but as well with binary and continuous de jure measures based on the IMF data on financial convergence. De jure measures often overestimate the actual degree of integration because of widely present 'mock compliance' to international regulation recommendations such as the Basel I and II Accords (Walter, 2010). Chinese example testifies that de jure measures can also underestimate the level of integration. This is because, despite its extensive regime of capital controls, China was not able to stop inflows of speculative capital in recent years (Prasad & Wei, 2007; Martin & Morrison, 2008). For optimal results Prasad et al. recommend the usage of the quantity-based measure for international financial integration, given as follows by Milesi-Ferretti and Lane:

$$IFIGDP_{it} = \frac{(FA_{it} + FL_{it})}{GDP_{it}} \qquad (2)$$

i.e. the sum of gross stocks of foreign assets and liabilities as a ratio of GDP (Lane & Milesi-Ferreti, 2003). Regardless the approach used to measure the degree of financial integration, there is a general agreement that the estimates should be followed by assessments of trends in the integration processes themselves[59].

- Benefits and Costs

The benefits of financial market integration include: opportunities for better risk sharing and diversification, better allocation of capital, smoothing of consumption, greater macroeconomic discipline, deepening of financial markets, increase in efficiency of banking systems and of financial utilities systems, the exchange of know-how and of the best practices (Baele, Ferrando, Hördahl, Krylova, & Monnet, 2004; Agénor, 2003).

On the other hand, the costs of financial integration include: the procyclicality[60] of short-term flows, temporary loss of macroeconomic stability, the volatility of capital flows, the reduction in scope for risk diversification in international markets, and the risk that the entry of foreign agents might significantly alter the division of domestic market shares (Agénor, 2003). Economic research offers no robust empirical evidence for the widely used claim that financial integration stimulates economic growth. This is an important difference between financial openness and openness to trade, as latter has an established positive effect on economic growth (Schmukler, 2004).

In a wider sense, it has been shown that financial market integration might not produce the most optimal outcome unless it leads to complete markets, i.e. markets where idiosyncratic risks can be fully hedged (Hart, 1975). Incomplete markets are generally deemed Pareto suboptimal. Hart notes that opening new international markets in a system where the already established common markets are not fully integrated can lead to even worse solutions for the overall financial system.

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[59] sustainable vs. unsustainable; long vs. short-term

[60] procyclical is any quantity that is positively related with the overall state of the economy. Procyclicality refers hence to the tendency of quantities to stimulate economic fluctuations.

Moreover, initial conditions put important constraints on the success of the integration process. Favorable conditions for the integration of financial markets include: a developed financial sector, better quality of institutions, higher quality of domestic macroeconomic policies and even pre-established trade integration (Schmukler, 2004). Hence the noted difference in the impact financial integration has on developed and developing countries. Kose et al. suggest, though, that there exists a level of gross capital flows at which further integration will actually decrease the ratio of consumption volatility to income volatility, i.e. there exists a phase transition up until which the integration process is necessarily costlier for the developing countries (Kose, Prasad, & Terrones, 2003). Stiglitz points out that, in case the underlying technologies are not convex, as it is commonly assumed in the economic theory, financial integration is far from an optimal solution. He notes that there exist architectures for which even autarchy could be a superior solution to full financial integration (Stiglitz, 2010).

- Developed vs. Developing Countries

Difference in the impact financial integration has on developed and developing [61] economies attracted recently considerable attention from the economic academic community. Two particular momentum generators in the research are the 1990s crises in the emerging countries, and the GFC, which originated in and primarily affected the developed economies. In their extensive analysis which covers 145 countries during the period of 1970-2004, Lane and Milesi-Ferretti identify a number of important effects for the GFS that are rooted in this differentiation (Lane & Milesi-Ferretti, 2007).

The first is the opposing shift in the composition of external balance sheets of the two groups. The world's leading economy, the U.S., considerably increased its reliance on debt as a source of external finance, while many of the emerging economies increased the equity component of their external liabilities and acquired substantial foreign reserves. Notable differences in the composition of countries' external portfolios include as well the orientation of developed countries towards the 'short debt, long equity' model, whereas in emerging countries it is typically 'short equity' with net liabilities in debt. The authors note, however, that apart from the U.S., the regions with the largest increase in net liabilities are all developing regions with the liberalized capital flows: the post-2004 EU entrants, the ex-Soviet block and the countries of Latin America. Conversely, the economies in the East Asia, the Middle East and Africa have experienced considerable improvements in their external

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[61] common synonyms for "developed" economies include industrialized, post-industrial, western, northern, advanced, first world, while for "developing" economies these are emerging, newly industrialized, southern, eastern, third world, etc. The following are the countries that have been "upgraded" into developed economies since 2000: Cyprus, Slovenia, Malta, Czech Republic, Slovakia, Estonia (IMF, 2011e)

portfolio. Some of these economies were even promoted into major international investors, reshaping the nature of international asset trade.

The second effect is the growing importance of the so called 'valuation channel' of external adjustment. Specifically, the two main channels for external adjustment to changes in a country's net foreign asset position are the trade channel and the financial channel. The former is the change through the variation in quantities and prices of goods and services, the latter is the variation in asset prices and returns. Valuation channel is a specific component of the financial channel. It works exclusively through country's capital gains/losses on the stock of gross foreign assets and liabilities which are due to the changes in asset prices (Ghironi, Lee, & Rebucci, 2009). What Lane and Milesi-Ferretti conclude is that the changes in net foreign asset prices are significantly more volatile than the current account, and that the difference in volatility between these two parts of the BOP is persistent both in developed and developing economies. This is an important source of long-term shifts in net external positions.

Finally, the authors point out the expansion in the international asset trade in developed countries since the early 1990s that was not matched by the asset trade in developing economies. The stunning increase in asset trade outpaced as well the expansion of goods trading in developed economies themselves. On the other side, in developing economies trade in goods increased more rapidly than in the developed countries for the same period. The given trend is another important difference between financial and trade integration processes. It implies that the core momenta for the two processes are diverging, with intensified financial interactions in developed economies and intensified real trade interactions in developing ones.

- **The Three Flows**

The difference in the effects financial integration has on the two groups of countries is evident in all three principal types of capital flows: the flows of foreign direct investments (FDIs), the equity flows (portfolio investments) and the debt flows (long and short-term loans). FDIs and long-term loans are generally regarded as stable flows, whereas portfolio investments and short-term loans tend to show substantial volatility (Steinherr, Cisotta, Klär, & Šehović, 2006). The G7 remain the principal sources and recipients of all asset flows. Financial development feeds stronger crossborder linkages for all asset classes. Geography is, however, relevant as the physical distance remains a valid proxy for information quality. Historical and cultural linkages also matter, but are not equally relevant across the asset classes. Equity flows are more sensitive to global factors than other assets. Finally, size of the economies, income level and trade relations explain significant fraction of inter-quartile variation across all assets. (IMF, 2011d).

FDIs are deemed essential stimuli for national economies upon their liberalization. This is because stable access to the FDI flows is often promoted as the principal reward for the integrating economies at the end of their, often rough, transition to financial openness. The incentive is additionally stimulated by the fact that the most financially integrated economy, the U.S., is simultaneously the world's largest recipient of FDIs. During and following the GFC inflow of FDIs in the U.S. actually increased. Some argue that this is due to the central role the U.S.'s financial system plays in the GFS (Oatley, Danzman, Pennock, & Winecorff, 2011). The last two decades have, however, showed a considerable divergence of flows towards the emerging markets, China and India in particular. China is by now in the range of the U.S. levels of

FDI inflows, and is expanding rapidly its investments abroad too, particularly to other Asian economies and in Africa. For both the U.S. and the emerging economies, though, the GFC demonstrated the limits of growth strategies that are based on the financial integration and inflows of FDIs (Bellocq & Zlotowski, 2010).

As for the equity flows, Beine et al. show that financial integration stimulates the comovement between international stock markets (Beine, Cosma, & Vermeulen, 2010). The comovement is stronger on the left tail of the return distribution. Beine et al. also confirm the hypothesis that financial openness tends to increase comovement in periods of low returns for all integrating markets, increasing therefore the likelihood of a joint crash. Their results additionally emphasize the asymmetric impact of comovement coming from the exchange rate volatility and monetary integrations. The former effect has a strong positive impact on the lower tail comovement, while its opposite, the introduction of a single currency, has a strong effect on the comovement in the upper tail. Finally, the authors warn that investors are likely to experience more difficulties in reaping the gains from asset diversification, particularly in the times of poor economic performance, when diversification is instrumental.

Claeys et al. examine the impact of financial integration on the debt flows (Claeys, Moreno, & Suriñach, 2011). They focus on crowding out and spillover effects as important consequences of bond market integration. Crowding out effect is a reduction in private investments following the increase in government borrowing. Spillover effects essentially mean that the occurrences in one of the integrating parties, particularly those related with the interest rates, tend to affect simultaneously all the other parties. What the authors notice is another

divergence in the effects on developed and developing countries. Namely, while the crowding out effect of public debt on domestic long term interest rates is small in the developed economies, it can be detrimental for the developing ones. On the other hand, the spillover effects are much stronger over the OECD economies, particularly in the EU. For the EU markets the spillover effects on the long-term interest rates are actually as important as the domestic crowding out effect of higher public debt for the other countries. The spillover effects, however, are not negligible between the developing economies either. Approximately 44% of the change in long-term interest rates abroad spills over to the domestic emerging financial market. In the EMU example, the authors show that in the absence of strict specification of fiscal relations between the governments, the crowding out effect depends, ceteris paribus, on the aggregate fiscal policy of all the members of the union. Straightened spillover effect, particularly through the "import of monetary credibility" from Germany and Benelux, enabled other EMU economies to disregard, to some extent, their own intertemporal budget constraints, and to issue long term bonds at various time horizons. In the EU economies that were running high levels of debt during the 2000s the resulting better economic outlook was instrumental for the boosts of tax revenues, risk premia reductions and consolidation. This has proven to be a major weakness in the GFC, as the sovereign debt crises proliferated throughout the periphery of the EMU. In contrast, the majority of developing economies have great trouble finding additional sources of capital in hard times, being at the 'periphery' of the GFS. They are restricted to short-term finance in capital markets and can thus rely on, at most, five year-horizon-bonds to finance their deficits. Finally, Claeys et al. find that crisis episodes are responsible for much larger spillover effects across both groups of countries, as the spatial distribution then essentially loses relevance.
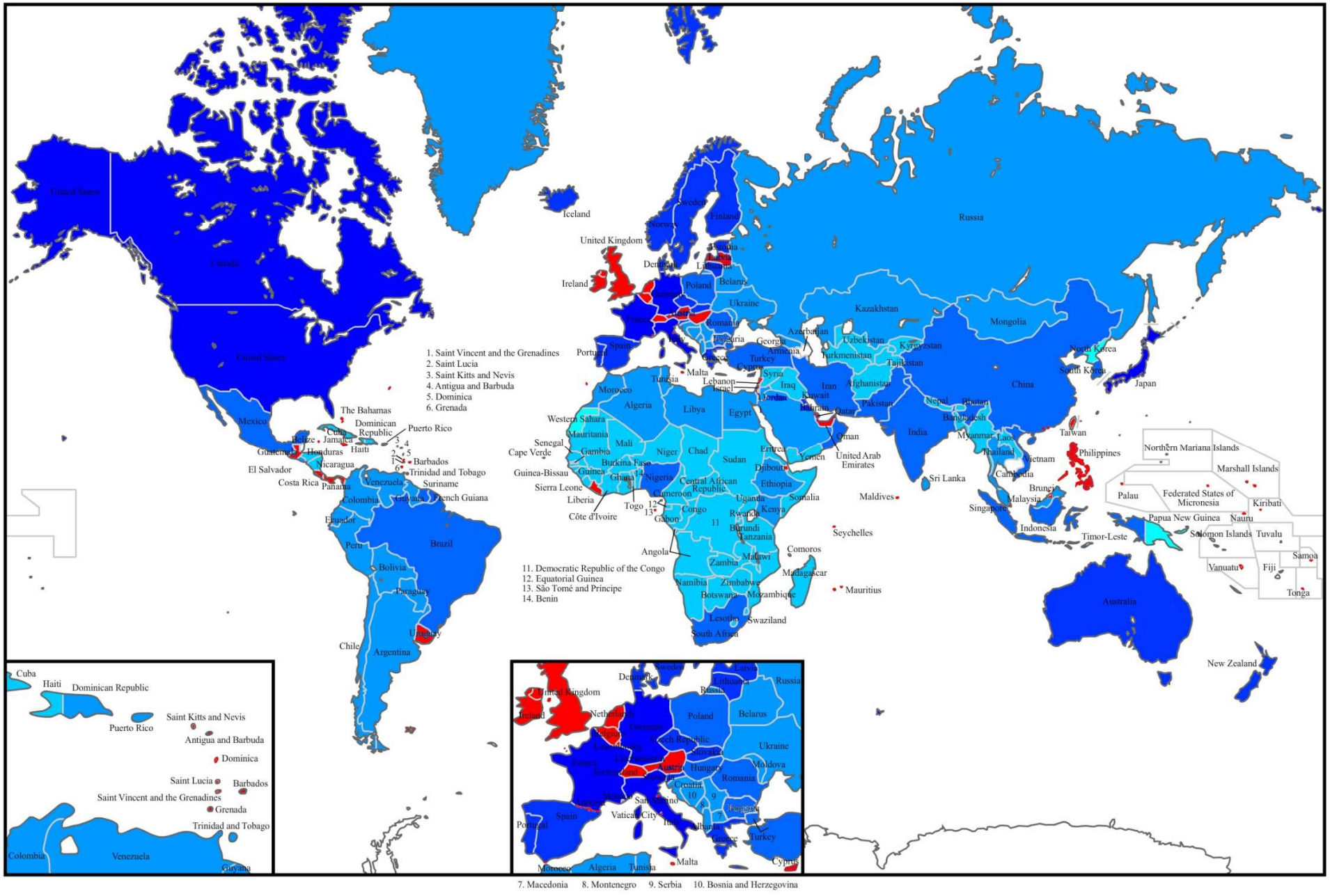
Figure 3: Map indicates the economies generally treated as international (offshore) financial centres in red, and gives a gradient of the extent of other national economies in blue (darkest being considered the advanced and fairest being considered the least developed economies) (IMF, 2006b; IMF, 2011e)

- Integration of Financial Institutions

As for the integration of financial institutions, there is a case for both intra- and international integrations. In the two decades prior to the GFC the widespread trend towards financial liberalization gave momentum both to globalization of finances as well as national deregulation. The momentum was particularly strong in the U.S. and in the EU, where integration implied both geographical expansion of financial markets as well as the expansion of individual institution's activities across various financial sectors.

Interstate banking[62] was for a long time prohibited or discouraged in the U.S. by the states themselves through their fiscal strategies. In some states even intra-state branching was prohibited in order to assure government's utility from the rents and competition in banking industry (Kroszner, 2008). In the early 1970s, 13 U.S. states allowed unrestricted instate branching and in 1978 Maine pioneered reciprocal interstate banking. In 1994, the Riegle-Neal Interstate Banking and Branching Efficiency Act (IBBEA) allowed banks to purchase or establish subsidiaries in any state nationwide and triggered a wave of mergers and acquisitions. The consequence of the interstate banking liberalization was that the number of commercial banks and other FDIC-insured institutions decreased radically from close to 14 500 in 1984 to 9 267 in 1997 (Garcia, 2008). The consolidation occurred primarily within individual states.

The 1999 repealing of Glass-Steagall Act[63] allowed banks to pursue a wider range of financial activities and to acquire, or be acquired by non-bank financial institutions[64]. This step was perceived as necessary in order for larger U.S. banks to be able to compete with European and Japanese counterparties (Saunders, Smith, & Walter, 2009). In the process, the number of FDIC-insured institutions dropped additionally by approximately 500 before 2006, while the number of branches increased by more than 20% to close to 86 000. Simultaneously, numerous large scale integrations occurred outside the traditional banking sector (Wilcox, 2005). The institutions were viciously competing to claim a larger share of the new integrated market for financial services, with the ultimate consequence being the emergence of the so called 'large, complex financial institutions' (LCFIs)[65].

LCFIs are defined as financial intermediaries which engage simultaneously in a number of diverse financial activities, including commercial banking, investment banking, asset management and insurance, and whose failure poses a systemic risk for the financial system as a whole (Saunders, Smith, & Walter, 2009). The LCFIs can contribute to the risk by causing informational contagions on other financial institutions, by exerting depressing effects on asset prices and by reducing in overall market liquidity. The key characteristics of the LCFIs are their size, complexity, financial

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[62] to be distinguished from nationwide banking, which was allowed under the dual system
[63] an explicit prohibition for a bank holding company to own other types of financial companies

[64] even insurance companies, which is even beyond the European 'universal banking '
[65] many of these institutions are also known as the 'financial supermarkets' because of the range of financial services they provided, the prime example being the Citigroup, which was the largest company and bank in the world prior to the GFC. During and after the GFC, these institutions were commonly referred to as 'too-big-to-fail'. The qualification itself has, however, already been introduced in the 1980s, during the resolution efforts for the Continental Illinois Bank & Trust Co. Continental pursued an aggressive and risk abounding growth strategy during the late 1970s and early 1980s, and became in the process one of the largest financial institutions in the U.S. Soon, however, it turned highly unstable and was headed towards a default by 1984 (FDIC, 1997). The resolution of the bank provoked a heated debate about the equality in treatment between large and small banking institutions in the U.S., an issue which transcends into modern post-GFC discussions.

interrelatedness with other institutions and their global activity. The leading LCFIs, such as the Citigroup control assets worth more than $1 trillion. As for the complexity and the intricacy of relations a good example is that of the Lehman Brothers, which prior to the default operated a global business with over 100 different data systems that were owned and managed by some of the 6000 legal entities within the group (LSE, 2009). The largest LCFIs pursue the 'large balance sheet' business model, which gives them domination over wholesale finance and substantial market shares in other aspects of finance. Their expansion efforts during the 1990s and 2000s relied chiefly on persuading the investors that they are capable to deliver very high rates of profit growth[66].

The 2000-2 recession implied however strong constraints towards this goal, so the business model changed to intensive origination, underwriting, syndication and warehousing of mortgage-backed securities, corporate loans and other derivatives. During the GFC, this led to repeated instances at which some of the LCFIs lost control over their risk management functions, endangering considerably the wider NFSs and ultimately the GFS. In the turmoil bank-based LCFIs with access to retail deposits were more resilient to runs on the sources of funding, compared to insurance based LCFIs which relied primarily on the wholesale market financing (Saunders, Smith, & Walter, 2009). The leading LCFIs in the U.S. include: Bank of America, Citigroup, JP Morgan Chase, Wells Fargo, Goldman Sachs Group and Morgan Stanley.

In the EU, the introduction of the Single Banking License, as a part of the Second Banking Directive in 1989 was a decisive step towards a unified European financial market. The full integration of capital markets in 1994 and the elimination of currency related risks via introduction of the euro in 1999, acted as catalysts for the integration process. Number of separately charted credit institutions[67] in the EU declined from approximately 9 500 in 1995 to less than 6 400 in 2004 (Tumpel-Gugerell, 2005). Like in the U.S., the initial consolidation occurred primarily within different states themselves. Ayadi et al. point out the emergence of large national banks in the period between 1994 and 2001 as one of the key developments during the integrations, with the expansion of BNP Paribas in France, Santander in Spain, UniCredit in Italy, Royal Bank of Scotland Group in the U.K., etc. (Ayadi & Pujals, 2005). Cross-border acquisitions were not as prominent, but they included some of the high profile merges such as the acquisition of the Austrian Erste Bank and the German Hypobank by the Italian Unicredito (Allen, Beck, Carletti, Lane, & Schoenmaker, 2011). As for the cross-industry mergers and acquisitions, notable is the example of the Benelux economies, where the cross-industry transactions considerably outweighed the within-industry ones, creating incentives for emergence of financial conglomerates such as Fortis in Belgium and ING in the Netherlands (Ayadi & Pujals, 2005).

With the accession of 10 new countries in 2004, many of which post-communist economies, banking institutions in the core EU economies experienced additional branching proliferation, adding to a total larger than 210 000 branches by year 2006, twice as many as in the U.S. (Garcia, 2008). Because of the strength of their financial institutions, a small number of countries including France, Germany, the Netherlands, Switzerland and the U.K. swiftly dominated the cross-banking industry, accounting for more than a half of all crossborder banking assets and nearly as much of banking liabilities. Major financial institutions whose percentage of foreign assets in total assets topped 25% included

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[66] 15-20%

[67] read: banks

Deutsche Bank (82%), Santander (64%), UniCredit (62%) and BNP Paribas (%41) (Allen, Beck, Carletti, Lane, & Schoenmaker, 2011). The developments changed profoundly the underlying structure of the system, implying higher exposures of individual NFSs to external shocks, growth of financial institutions analogous to the one in the U.S., and increased importance of wholesale markets and interbank lending in provision of funding. In a number of countries, these sources of funding became more important than the retail deposits. For some economies, like Iceland, this strategy has proven fatal (Guðmundsson, 2011).

Experimentation in optimization of scales and scopes of financial institutions for the liberalized conditions led to important reorganizations in financial regulation. Different nations were affected differently. In the U.K. it stimulated the transfers of regulatory authority to a single institution, the FSA, throughout the early 2000s. In the U.S., the margins of regulation domains of existing regulators were essentially blurred. This pared with the duality of the U.S. financial system stimulated competition between the regulators (Wilcox, 2005). Moreover, the competition was stimulated internationally as the financial integration allowed for swift migration of capital and institutions all over the developed world. The resulting condition, known as regulatory arbitrage, prompted many countries to weaken regulation in order to attract businesses. Loose regulation, on the other hand, leaves countries vulnerable to external shocks. The national regulators have thus found themselves stuck in balancing off this twofold pressure (Eichengreen B. , 2010).

The trends are somewhat reversed after the GFC. The FSA is to be split into two entities in order to separate the regulation for commercial and

investment banking [68]. Simultaneously, extensive reformation is happening in the U.S. and in the EU, using the proceedings of the Dodd-Frank Act, the Vickers Report and de Larosière Report of (de Larosière, 2009; Masera, 2010; Vickers, 2011). The newly envisioned regulation is more complex[69], its implementation is more expensive, and it will require higher than ever international collaboration to be effectively implemented.

In spite the ongoing efforts however, the current international coordination of financial regulators is far from optimal. Eichengreen has argued extensively for the necessity of this step, in a form that will go beyond the one-size-fits-all regulation and the so called 'lowest common denominator' regulation[70] (Eichengreen B. , 2010). Eichengreen additionally recognizes that the diversity in regulation may be as instrumental to financial systems as biodiversity is for ecological systems. What he proposes is 1) regulation which reflects the weight of the particular parts of the NFSs, and therefore their structure 2) coordination of regulation by sanctioning unilaterally both the non-complying countries and financial institutions, 3) guaranteed representation of non-official interests at decision-making sessions regarding the unifying regulation, 4) creation of an international body, the World Financial Organization, which would, like the WTO, establish the binding principles for prudential regulation and supervision for all of its members, without attempting to prescribe structure in detail.

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[68] the Prudential Regulatory Authority (PRA) and the Financial Conduct Authority (FCA), with former joining the Bank of England. The idea behind the split is that it allows for better coordination with other, tripartite entries of the government's financial supervisory framework (the Bank of England and the Treasury).

[69] to give a simple hint, the Glass-Steagall act spread out to 37 pages, while Dodd-Frank is 848 pages long

[70] international agreement on minimally adequate capital ratios for internationally active banks

- The Sister System

Eichengreen is not alone in suggesting the regulatory mechanisms for global trade as a role-model for establishing global financial regulation. Gadbaw gives extensive argumentation for why it is important to take into account the experiences from both systems (Gadbaw, 2010). The two sister systems have evolved differently through the globalization and integration of markets. While trade integration was an integral part of international political agenda ever since the WWII, financial integration has a record of polarizing the authorities. Moreover, the agents in the GFS have consistently opposed thorough supranational regulation (Claessens & Underhill, 2010). The global trade regulation was developed consistently through trial and error, adjudication, dispute settlements and sanctions. In spite the apparent failure of the current Doha round of negotiation, the previous 8 rounds[71] produced tens of thousands tariff concessions worth billions of U.S. dollars. The result is a considerably higher degree of enforcement and compliance by the member countries, as well as greater overall system's stability. Gadbaw goes as far as naming the WTO the most successful systemic regulator in the history of mankind. Trade integration acted as a primer for financial integration (Lane & Milesi-Ferretti, 2008). It generated cross-border financial flows, improved the exchange of information and thereby increased willingness to invest in foreign assets. Gadbaw points out the magnitude of the stakes trading system has in the IFA and the GFS designs. He concludes by arguing for compulsory representation of global trading regulators, such as the WTO, in the FSB and other global bodies which influence the design of the IFA.

- Consolidation and Convergence

Regardless the regulatory efforts, some parties are usually hurt by the integration process (Allen & Gale, 1997). Moreover, when structurally different financial systems open up for integrations the financial opportunities remain far from fully explored. In their overlapping generation model Allen and Gale show that bank based financial systems are better at risk sharing in intertemporal terms than the market based ones. In the intermediate systems, which are more realistic, the structures act as constraints to each other because of the free entry and exit. A question arises therefore on how much does the convergence in financial standards and organization of financial systems help in the exploration of these opportunities.

Some authors argue that convergence of financial organization, as well as compliance to standardized regulation and financial reporting, is helping both systems' stability and efficiency. Others however claim that consolidation and compliance that follow financial integration are actually exposing NFSs to greater instabilities and risks (Agénor, 2003). Consistent with the introductory remarks is the argument that financial integration is an important factor in explaining large external imbalances which emerged across the GFS since the liberalization began (Mendoza, Quadrini, & Rios-Rull, 2009).

Mendoza et al. argue essentially that the problem lies in disparity between the extent of financial globalization and the extent of financial development. They note that, unlike financial globalization, financial development is not a global phenomenon. It is hence potentially harmful for poorly developed NFSs to integrate with the more advanced ones. On the other hand, the principal effect for the countries with deeper financial markets is the long and slow process of reduction of

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[71] Geneva 1947, Annecy 1949, Torquay 1951, Geneva 1956, Dillon Round 1960-61, Kennedy Round 1964-67, Tokyo Round 1973-79, Uruguay Round 1986-94

savings and large accumulation of net foreign liabilities. These countries are likely to borrow heavily and invest in risky foreign assets with higher yield – which has essentially been the manner of the U.S. for the past two decades[72]. Mendoza et al. do not doubt the sustainability of this incentive in the U.S. and claim that it should not be internationally destabilizing[73].

Excessive consolidation can be critical for competition because some of the infrastructure providers can take advantage of their market power. Consolidation can put higher pressure of contagion and systemic failures on specific parts of the system (Schimiedel & Schönenberger, 2005). It is however generally accepted that, with dedicated monitoring of the process, benefits of integration can prevail over costs (Baele, Ferrando, Hördahl, Krylova, & Monnet, 2004).

One of the fields in which convergence advanced the most in international banking, through implementation of Basel Accords. The accords are the BCBS's centre-pieces of the IFA that followed some of the major disruptions in the GFS. The very establishment of the BCBS and the implementation of Basel I was due to a messy liquidation of the systemically important Herstatt Bank in Germany, in 1974 (BCBS, 2004). Basel I was enacted by the G-7 in 1988 and it aimed at imposing minimal capital adequacy of 8% of the risk-weighted assets for the internationally active banks. The idea was to create buffers that could absorb losses without causing systemic problems. Additionally, Basel I aimed to level the playing field internationally. The Asian Crisis of late 1990s outed Basel I as obsolete,

in that that it was not able to account neither for financial innovation nor for the newly developed practices in risk management. Namely, internationally active banks went about the requirements by decreasing the amount of 'risky assets' through investments in sovereign debt of emerging economies. In 2000, Hellman et al. argued that while capital requirements can induce prudent behavior, a policy based solely on them fails to yield Pareto efficient outcomes (Hellman, Murdock, & Stiglitz, 2000). Namely, since capital requirements have a pervasive effect of harming banks' franchise values, they actually are encouraging gambling. Particularly under the liberalized conditions, such as those emerging from the Glass-Steagall repelling, risk seeking institutions have a comparative advantage, being able to offer higher rates of interest. Hellman et al. argue that Pareto-efficient outcome can be achieved by adding deposit rate controls, which would facilitate prudent investment by increasing franchise values.

The more extensive, Basel II was proposed by the G-10 in 2004 and was implemented[74] in over a hundred other countries and territories. Accord had three base pillars, the first were stricter minimal capital requirements and the second was stronger bank supervision. The third was imposing a higher degree of market discipline by `requiring greater transparency from the banks and by engaging third party analysts and rating agencies to review the bank activities and their risk exposures. The flaws of Basel II were uncovered in the GFC (Claessens & Underhill, 2010). Firstly, a number of developing countries opposed its de facto implementation due to its unbalanced input side, its procyclicality and the high costs it would imply for their banking systems. Basel II was in addition seen as biased against small and medium size enterprises and

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[72] some of the economies that are regionally and not globally central, like Germany, China, Brazil, have opposite incentives to the U.S. ones. Rightfully though, apart from Germany's, the depth of financial markets of other regionally central economies is still not properly estimated

[73] the paper is published 1 day before the Lehman default

[74] at least de jure

therefore, prone to distorted impacts on competition. The most important failure of the Basel II regards the effectiveness of the market based approach to supervision, as the GFC confirmed that extensive self-regulation is not the direction the IFA should aim for.

Even more ambitious, Basel III Accord was consolidated during the year 2011 among the G-20, and is set for implementation in the course of next eight years. It involves: even stricter capital adequacy requirements, risk coverage for the capital framework, stricter requirements on bank liquidity and leverage, a global minimal liquidity standard for internationally active banks and a number of measures to address procyclicality and resolution of systemically important banks. The actual implementation of the Accord, is again a challenge far greater than its design. The fact that it was backed up by the G-20 aids to the goal, but the estimates of the overall costs related to the reform have generated strong opposition in both private and public sectors. The OECD estimated that Basel III will have a negative impact on the global economic growth (Slovik & Cournède, 2011). Additionally, the resolution of the ongoing ESDC is likely to affect the implementation agenda in the advanced economies. Finally, the agenda is nearly one decade long, allowing sufficient time for various parties to affect the implementation and lobby for adjustments. This coupled with the political situation in the EU and the rate of financial innovation, implies that even if successfully ratified by the majority of the economies, the implementation of Basel III might be of limited overall use to the GFS.

Basel Accords exemplify the core regulatory problems emerging from modern financial integrations. Namely, since 1) there exists no single setting which can be of equal utility to all of the involved nations and institutions, 2) there is no longer a dominant international political authority to enforce the regulation[75], 3) it is increasingly costly to impose effective international regulation, 4) there is no international institution which is trusted by all parties to regulate international banking, 5) the leading international banking institutions have enough power to affect the implementation agendas, the Basel implementation is actually turning into a waiting game in which only a strong systemic crisis event can enforce all or some of the involved parties to de facto comply to the conditioning. Such a setting can induce profoundly perverse incentives among individual agents, with negative repercussions far outside the GFS, into the real economy and international politics.

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[75] the number of economies directly involved in the design of the Basels increased from 7 to 10 and then to 20

Summary	Financial Integration				
Function	transforms different parts of a single NFS or of a group of different NFSs into a single financial structure				
Motivators	freedom of movement of capital, trade integration		Type of process		systemic, heterogeneous
Catalysts	technology, securitization		**means / estimates**		

Integration of Markets	**levels**		interest parity for offshore rates	removal of arbitrage options between the OFCs
			offshore and onshore integration	liberalization of capital controls related regulation
			covered interest rate parity	frictionless capital mobility (apart from the exchange rates)
			uncovered interest rate parity	difference in interest rates equal to anticipated change in exchange rates
			real interest rate parity	difference in interest rates equal to anticipated change in inflation rates

	measures		price based	discrepancies in pricing of assets caused by their geographic origin
			news based	persisting friction arising from the asymmetry of information
			quantity based	tendency to invest domestically regardless of foreign yield options
			de jure vs de facto	IMF fiscal convergence data / foreign assets and liabilities by GDP

benefits	risk sharing and diversification, better allocation of capital, smoothing of consumption, macroeconomic discipline, deepening of financial markets, increasing efficiency of systems, exchange of know-how, stimulates competition
costs	procyclicality of short-term flows, (temporary) loss of macroeconomic stability, volatility of capital flows, reduction in scope for diversification, radical changes in market share due to foreign entries, regulatory arbitrage

Countries		**Lane & Milesi-Ferretti**		**FDIs**	**equities**	**bonds**	
	issues pointed	external balance sheet composition	assets vs. goods trading	change in FDI targets	comovement between stock markets	crowding out	spillover
	developed	short debt long equity	assts trade boost	equal or decreased (except in the U.S.)	strong positive impact on upper tail comovement	small	strong
	developing	short equity liabilities in debt	goods trade boost	increasing inflows, esp. in BRIC countries	strong positive impact on lower tail comovement	detrimental	exists
	all	valuation channel		unsuitableness of FDI-based growth strategies	procyclicality risks	under large crisis events distinction irrelevant	

Integration of Institutions	**level**	**principal issues**		**needed**	**potential role-models**	**consolidation issues**
	national	preceding deregulation		reform of regulation	least affected OECDs	autonomy
	international	regulatory arbitrage; differential in financial development		international coordination	WTO	adverse competition
	milestones	**U.S.**	IBBEA, Glass-Steagall repel, Dodd-Frank	**EU**	2nd Banking Directive, Single Market, the euro	

2.3. Monetary Integrations
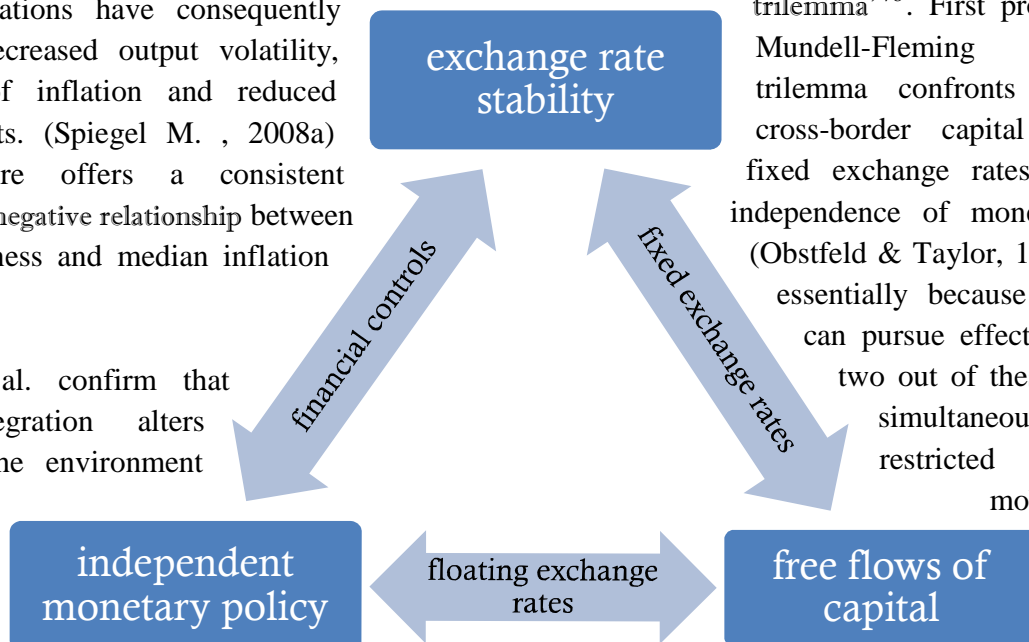
- Financial Integration & Monetary Policies

Consolidation with national monetary policies is one of the principal challenges in reaping the benefits from financial integration. Monetary policy is one of the two types of macroeconomic government policies [76] used to regulate national economies. It acts essentially through the change in interest rates or the change in the overall money supply, and targets price stability and unemployment. A sizable body of economic literature addresses the effects of financial openness and integration onto a country's monetary policy, and vice versa. Spiegel notes that the increased exposure to external shocks that came with the financial openness did well for some of the economies' monetary policing. It acted as an additional source of market discipline and encouraged the stabilization of the prices relative to the output. Nations have consequently experienced decreased output volatility, lower rates of inflation and reduced borrowing costs. (Spiegel M. , 2008a) Other literature offers a consistent evidence for a negative relationship between financial openness and median inflation levels.

Devereux et al. confirm that financial integration alters considerably the environment within which monetary policies operate, but it need not necessarily alter the fundamental objectives of the policies (Devereux & Sutherland, 2008).

Their analysis confirms that the preferred monetary policy for financially integrated economies is the one which implies strict price stability [77]. This is because of the dual effect which this type of policy can insert. On one side, it can be used to support the flexible price equilibrium of the economy. On the other, it can enhance the degree of international risk-sharing by improving the hedging properties of nominal bonds. The two properties are mutually independent. Devereux et al. note that in an environment where nominal bonds are traded, a policy which aims at strict price stability will endogenously generate full international risk sharing. The authors argue that a non-trivial welfare case for price stability exists even if asset markets are incomplete.

Interplay between financial integration and management of monetary policies is commonly discussed in terms of choices which open economies make in the 'macroeconomic policy trilemma' [78]. First proposed in the Mundell-Fleming model, the trilemma confronts freedom of cross-border capital movements, fixed exchange rates regime and independence of monetary policies (Obstfeld & Taylor, 1998). It arises essentially because governments can pursue effectively at most two out of these three goals simultaneously. In case of restricted capital mobility, country with a fixed

exchange rate
stability

independent
monetary policy

free flows of
capital

financial controls

fixed exchange rates

floating exchange rates

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[76] fiscal policy on the other hand regulates the economy through changes in government spending and tax levels

[77] this is the principal property of monetarism, which argues that activist monetary policies can become sources of instability and that central banks should focus primarily on maintaining price stability (de Grauwe, 2006)

[78] also known as the inconsistent trinity proposition, the Mundell-Fleming trilemma, the irreconcilable trinity, the unholy trinity

exchange rate is capable to break ranks with foreign interest rates and run an independent monetary policy. Likewise, with a floating exchange regime, a country can reconcile freedom of capital mobility with an effective monetary policy. Finally, a country with both free capital movement and stable exchange rates has limited autonomy in practicing its monetary policy to achieve domestic goals.

Obstfeld et al. use the trilemma to explain the secular movement in international lending and borrowing. Assuming that the incentive for freedom of capital mobility and financial integration has prevailed, the trilemma has essentially been reduced to a dilemma: control over monetary policy versus control over exchange rates. Intermediate exchange rate regimes, e.g. soft pegs, are deemed unviable because they are hard to communicate to the markets and because their maintenance is difficult under international capital mobility.

Nevertheless, it has been shown by Bersch that it is common for countries to go about the trilemma issue by declaring a different exchange rate regime from the one they actually follow (Bersch, 2008)[79]. In her analysis Bersch reviews exchange rate regime choices of 133 countries over the period of 1973-2004, and finds that nearly one half of all observations indicate inconsistencies between declared and applied exchange rate regimes. The communicated regimes are at the corners of the flexibility spectrum, which is to say either stable or floating, while more intermediate regimes are actually operated. Bersch shows that the declared type of exchange rates is dependent on trade volumes and country's financial infrastructure, as well as the level of financial development and financial openness.

She separates the countries which show inconsistencies into two groups: the ones that intervene more than announced (IMA) and the ones that intervene less (ILA). Over the observed period, the frequency of the IMAs has been increasing at the expense of the ILAs. This is consistent with the global developments related to financial openness and integration.

The ILA regimes offer a way to simultaneously achieve short term nominal exchange rate stability along with medium term flexibility in monetary policing. Crisis periods and high inflation periods often place countries in this category. The IMA regimes, on the other hand, foster financial market development by partially insulating economies from disruptively high fluctuations in exchange rates. Overall, the trilemma is a good proximate explanation for the developments in the GFS. Deeper sociopolitical forces should also be accounted for in order to reach a better understanding of relative dominance between various policy targets.

Apart from the initial choice of operational framework, monetary policies affect the modern financial systems through four principal channels of transmission (Kamin, Turner, & Van't dack, 1998). The first is the effect monetary policies have on direct interest rates. This channel affects essentially the cost of credit and flows of liquidity between debtors and creditors because it changes the marginal cost of borrowing. Furthermore, it affects significantly the aggregate demand. The second channel is the impact monetary policies have on domestic asset prices. The third is through the exchange rate regime, and the last one is through the impact on the availability of credit.

Rogoff finds that even though monetary policy transmission channels of individual countries matter

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[79] a.k.a. signalling by inconsistency

less in the integrated setting, the collective influence of central banks over real interest rates remains rather strong. There exist some central banks that are exceptions to this rule, due to their special position in the system. The reference is primarily to the FED, whose influence remains greatly leveraged by U.S.'s position as the international leader. What guarantees this position is the fact that central banks of numerous Asian and oil exporting economies continue to stabilize their currencies against the U.S. dollar, even though the U.S.' share of the global GDP is shrinking (Ragoff, 2006).

Ehrmann et al. run a more in depth analysis of the effects the monetary policy transmission channels have on the GFS's functioning (Ehrmann & Fratzscher, 2006). They find that the FED's policy is an important determinant for international equity markets. A 100 basis points tightening of U.S. monetary policy is responsible for on average 3.8% fall in returns on the 50 equity markets they analyze. The actual span goes from close to 0% in countries with strong capital controls like China, India and Malaysia, to up to 10% in countries like Australia, Canada, Finland, Indonesia, Korea, Sweden and Turkey. Interestingly, they find that the degree of global integration of countries is the key determinant for the intensity of this transmission process, not the level of country's bilateral integration with the U.S. The latter underlines the complexity of the monetary policy transmission channels and has important implications for portfolio diversification and risk-sharing.

The two principal transmission channels of the U.S. monetary policies are the impact on direct interest rates and the effects on exchange rates. The authors estimate that the shock transmission to the international equity markets is up to three times stronger when U.S. short-term interest rates show higher sensitivity to the U.S. monetary policy. On

the other hand, transmission appears insensitive to the behavior of U.S. long-term interest rates. As for the second channel, a number of countries experiences strong sensitivity of their exchange rates to the U.S. monetary policy shocks. The result is a two to threefold larger than average response in their equity returns. Transmission channels are stronger if the policy affects the prices of the U.S. assets. Open economies with developed financial markets are the ones that react significantly stronger to the changes in the U.S. monetary policy. So do the countries holding larger amounts of foreign financial assets or having larger amount of debt to foreign entities. Moreover, Ehrmann et al. show that the reactions are independent of the type of capital on which the financial interactions are based, e.g. FDIs, portfolio equity investment and debt investment. Overall, the findings suggest that U.S. monetary policy and its shocks are in effect systemic rather than idiosyncratic, because they tend to simultaneously affect a large number of national financial markets. As such, the risks related with the U.S. monetary policy shocks are systemic as well, and cannot be fully diversified or hedged.

- International Monetary System

One of the reasons why the U.S. monetary policy is systemic for the GFS is the fact that the U.S. dollar is the most important reserve currency under the current international monetary system (IMS). The IMS is an internationally agreed set of rules, conventions and institutions associated with monetary policies, official capital flows, provision of international liquidity [80] and management of exchange rates. It is the platform which consolidates monetary incentives of individual nations with the international financial development and the IFA. The IMS can be additionally regarded as the economic, political and institutional environment which determines the delivery of two fundamental elements of international finance: international currencies and external stability (Dorrucci & McKay, 2011).

International currencies facilitate international financial activity as universal means of payment and storage of value. External stability implies a sustainable global network of real and financial linkages which prevents disruptive events such as disorderly exchange rates and asset price swings. Dorrucci et al. argue that the two elements are in fact global public goods as they are non-rival and non-excludable. Consumption of these goods by one country does not constrain others', nor is it possible to prevent the consumption of these goods by entities that did not contribute to their supply. Both goods are therefore underprovided, as the returns on them are lower than the respective costs of provision. Consequently, a fully functional IMS benefits all nations, while a malfunctioning IMS is everybody's problem.

A national or regional currency can become international only if the international community is willing to hold assets denominated in this currency. Issuers of currency should therefore pursue credible and sustainable policies to preserve the trust of international markets. At times, however, incentives to provide both goods can lead to a dilemma [81] in prioritizing between internal and external balance. Claims denominated in international currencies are the primary sources of global liquidity. Excessive provision of global liquidity erodes, however, the position of international currencies, particularly when correlated with unsound policies in the issuing economies. From the BOP point of view, this implies inability to effectively finance national deficit or to adjust it. Dorrucci et al. claim that the functionality of an IMS is dependent on the willingness of investors to finance the issuers of international currencies and the readiness of issuers to adjust to imbalances, if and when they occur.

IMS is arguably the global system with the largest number of profound restructurings over the course of the past century. It reflects the power distribution in global political and economic affairs, and is sensitive to the shifts in power balance. During the first globalization era the IMS was based on the gold exchange standard. The system involved circulation of currencies for which the authorities guaranteed international convertibility in terms of a fixed weight in gold. As such, it was effective at ensuring external stability of the economies, as the flow of gold acted to adjust the prices and stabilize countries' current account positions. British leadership assured that this flows would have a counter-cyclical effect on the global economy. In contrast, the maintenance of internal balance, which is to say full employment and stable price levels, was at times a true challenge for the authorities. In terms of macroeconomic policy trilemma, gold

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[80] includes mechanisms to provide support to countries facing funding pressures (Yellen, 2011)

[81] the Triffin dilemma

standard allowed for free flows of capital and fixed exchange rate, but it restricted the independence of monetary policies. The escalation of the WWI suspended effectively the system in 1914 (Krugman, Obstfeld, & Melitz, 2010). After the war was over, a number of countries tried to implement variations of the gold standard system, but this proved unsustainable under speculative attacks and the escalation of the Great Depression. The urgency to address internal balance discouraged international integration. Authorities avoided the external balance related problems by partially closing their economies and by forgoing the benefits from international cooperation and competition. The IMS did, therefore, de facto not exist.

After the WWII, the representatives of 44 Allied nations gathered in the Bretton Woods, NH and agreed on the design of a new IMS. In that aspect, the Bretton Woods system was not developed spontaneously, but strategically, as a result of exhaustive negotiations, much like the trade system. The support to the IMS was institutionalized and a number of organizational supranational bodies were established, e.g. the IMF and the WBG. The goal was to provide a fixed exchange rate support for encouragement of international trade, while national external balances were kept flexible enough to prioritize internal issues. The IMF's role was also to provide financing for countries with deficits and to manage the adjustments of exchange rates for over- or undervalued currencies. All currencies were pegged to the U.S. dollar, with the FED guaranteeing the convertibility of dollar to gold at a bilaterally specified rate (Krugman, Obstfeld, & Melitz, 2010). Under the trilemma, the system allowed for a stable exchange rates regime along with independent monetary policies at the expense of freedom capital movement. The system performed well in mitigating financial crisis events,

but it impeded efficient international allocation of capital. Reset of current account convertibility in Europe in late 1950s motivated reintegration of national financial markets[82]. Individual monetary policies became less effective and the flow of international reserves more volatile. The reserve currency country, the U.S., started facing external confidence problems. The foreign holdings of the U.S. dollar were to exceed the U.S. gold reserves (Guttman, 1997). In 1971, the U.S. authorities dismissed the commitment to dollar-gold convertibility. By 1973 the system was, gradually, abandoned altogether.

The Bretton Woods system was replaced by a system which entailed floating exchange rates and gradual capital account liberalization, while preserving the U.S. dollar as the leading reserve currency. The proponents argued that floats would give nations better control over their respective monetary policies, that they would act to eliminate fundamental disequilibria and would stabilize external balances. The float permitted developed economies to pursue sharp monetary maneuvers under two oil shocks in 1973 and 1979 and in the recessions that followed. The same maneuvers had dramatic consequences for the emerging economies. Sharp increase in the U.S. interest rates stimulated buildups of balance sheet imbalances all over Latin America, and eventually culminated into a regional systemic debt crisis in 1982 (IMF, 2011a). The system was therefore prone to buildups of substantial imbalances in the national current accounts, in spite the fact that it benefited individual investors and motivated further financial integration. In 1985, the G-5[83] agreed to take a coordinated action to depreciate the U.S. dollar, only to have the G-6 agreed to appreciate it two

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[82] as explained in detail in the section 2.2
[83] France, Japan, United States, United Kingdom and West Germany; G-6 includes Canada as well

years later. This is the beginning of the IMS known as the Plaza-Louvre system of managed exchange rates[84]. Japan, the U.S. and West Germany set broad target zones for the U.S. dollar / Deutsche mark and the U.S. Dollar / Japanese yen exchange rates, without actually announcing the zonal boundaries. Other developed countries supported the effort. The common conclusion that motivated this development was that exchange rates were too important to be left purely to market forces or to be residual to uncoordinated economic policies. The IMS therefore had to provide intervention and coordination options (Crowder, 2011).

The current IMS emerged following the Asian crisis and the introduction of the euro at the end of 1990s. The system is a crossbreed between the Bretton Woods system of fixed exchange rates and the preceding system of managed flows, with three major floating currencies being the U.S. dollar, the euro and the Japanese yen. As such, it bypasses the trilemma and is commonly referred to as the mixed system. The system aims to consolidate the reestablishment of the U.S. dollar area among the East Asian emerging economies and the Gulf oil exporting countries with the introduction of the euro as a new essential reserve currency (Dorrucci & McKay, 2011). Unlike the Bretton Woods, the mixed system does not impose restrictions on the supply of liquidity. The external stability is now dependent on both the stability of the current account and the gross capital flow patterns in the underlying asset/liability positions. Dorrucci et al. argue that the modern IMS is more than any of its predecessors related to the stability of the international financial system, and that it would probably be adequate to treat the entire setting as one international financial and monetary system.

The mixed IMS fails to embed sufficiently effective policy-driven or market-driven disciplining devices to ensure external stability. In fact, it allows systemically important economies to accumulate substantial current account imbalances. Imbalances are perpetuated by the flows that originate in emerging economies and are destined towards developed economies, primarily the U.S. This is a reversal of paradigm, as under the Bretton Woods the flows originated primarily in the G-7. The international investors are willing to provide funding to the U.S. in return for unconstrained accumulation of the U.S. dollar assets, given the scarcity of other credible investment alternatives.

The relationship is particularly strong between the U.S. and China (Dorrucci & McKay, 2011). China uses its public sector to direct residual savings abroad while building up an unconstrained pool of foreign reserves at home. Savings are directed abroad because the Chinese renminbi is not an international currency and because China lacks well developed welfare supporting functions that could stimulate consumerism. Promoting exports is a chief strategy for supporting the Chinese rapid economic growth. Exports are supported with stable exchange rates, and strong restrictions on capital mobility, much alike the Bretton Woods setting. The U.S., on the other hand, has a highly developed financial system, the U.S. dollar is the leading international currency and consumption is excessive. Consumption is supported and smoothed by the ability to borrow substantial funds from the rest of the world at historically low interest rates. The credit is readily available in normal times and strong expansionary macroeconomic policies are used in crisis events (Miller, Santos Monteiro, & Zhang, 2011).

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[84] according to the locations where the major deals were made

Table 2: Historical IMSs according to the macroeconomic policy trilemma

IMS	exchange rate stability	independent monetary policy	free flows of capital
gold exchange standard	√	X	√
Bretton Woods	√	√	X
floating exchange	X	√	√
managed flows	Greater	lower	√
mixed	regionally dependent		dominant

The IMS allows large economies great freedom to pursue their financial incentives. Budget constraints are loose in both private and official sector. The core economies that should be leading the efforts to assure external stability are actually adding the most to imbalances (Borio & Disyatat, 2011). Current account deficits and surpluses are used to improve competiveness without creating inflation pressures. In very integrated environments, like the EU, the mixed IMS conformed lax domestic policies and mispricing of economy specific risks. The IMS can thus be regarded as one of the root causes of the GFC and the ESDC. A profound reform of the IMS is needed, which would even out the imbalances, address the polyphony in political power distribution and account for the momentum acquired by monetary regionalization projects. In his addressing of the issue, the governor of Peoples Bank of China, Zhou Xiaochuan, suggested that a desirable solution would involve creation of an international reserve currency which would be disconnected from individual nations, and would thus be able to preserve more easily the long run stability (Xiaochuan, 2009). The currency could be supported by pooling parts of the reserves of member countries at the IMF, as the chief monetary institution.

- **Coordination and Convergence**

There is a general agreement that financial integration stimulates a wider, regional convergence in monetary policies. In fact, with financial integration at the basis, even just the coordination of international monetary policies is likely to create welfare gains (Sutherland, 2004). The gains should arise from the fact that the structure of financial system is affecting the international spillover effects of the policies, as discussed earlier. The structure of international financial markets is heavily influencing the nominal exchange rates, and the impact on the nominal exchange rates is the measure of monetary policy effectiveness in every open economy. In addition, international markets are vital for hedging country specific risks[85]. In a simple two-country-model which allows for variations in the market structure Sutherland shows that the gains in welfare from monetary policy coordination can be substantial for open economies. Furthermore, he finds that the welfare gains are sensitive to both market structure and elasticity of labor supply.

Coordination of monetary policies has proved recently to be a valuable tool in addressing the amounting pressures on the global money markets. Six major central banks [86] have opted for a coordinated action to enhance each other's capacity to provide liquidity support for the GFS (The Bank of England, 2011). They essentially agreed on a liquidity swap that is to provide all banks with an easy access to the six currencies, should they be required by the market conditions. The arrangement is to ease the strains arising from the ESDC, and to

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[85] both arguments assume the elasticity of substitution between goods produced by different countries to be different from unity. This is the setting under which asymmetric impact shocks are larger and the need for risk sharing is considerable.
[86] the FED, the Bank of England, the ECB, the Swiss National Bank, the Bank of Canada and the Bank of Japan

help foster economic activity of households and businesses in the advent of a sovereign default in the Eurozone. The scale of the collaborative effort is indicative of the importance of coordination of international monetary policies for the overall financial stability under the current IMS.

A step further into coordination is the actual convergence. Once set on track, monetary convergence can catalyze financial integration within the boundaries of the converging region. In a set of reports on the EMU, Spiegel shows that regional monetary convergence stimulated further the financial integration (Spiegel M. , 2004; Spiegel M. , 2008b). The analyses cover primarily the trends in commercial banking based on the BIS data for bilateral international claims. Spiegel identifies the increase in mutual attractiveness of regional borrowers and lenders under a single currency as the main force behind the increased regional financial integration. Single currency improved the quality of intermediation between borrowers and lenders by eliminating currency risks and by leveling asset prices. Stronger penalty pressure against defaults on debt obligations in regions that are monetarily converging is an additional motivator for financial integration. Sovereign defaults historically occur on all creditors simultaneously. Defaulting on the obligations of all fellow converging economies can put an economy into a harmful isolation and raise sharply its international costs of borrowing. Spiegel also points out that monetary convergence stimulates financial diversion and regional clustering. The strong orientation towards intra-regional interaction weakens the links with outer creditors and debtors. The market share for external creditors may drop to the level which can adversely affect their welfare.

- Optimum Currency Area

The theoretical basis for monetary convergence lies in the concept of the optimum currency area (OCA), a group of nations/regions with economies linked closely enough to consider a permanent linkage of their national currencies in at par fixed exchange rates (Krugman & Obstfeld, 2009). Traditional theory of OCAs was pioneered by Mundell in early 1960s and since then it has been used to argue which conditions are required for sustainable monetary integrations (Mundell, 1961; de Grauwe, 2006). De Grauve notes that three standard conditions for monetary convergence under this Mundell's theory are significant degrees of: correlation [87] in macroeconomic shocks occurrences, flexibility in factor [88] mobility and trade integration. Diversified production and compatible fiscal policies are also desirable under monetary convergence. Because of insufficient flexibility that characterized European continent prior to monetary convergence, this Mundell's theory encouraged skepticism about the effects of the future integration efforts.

In a subsequently postulated theory, Mundell, however, argued that under capital mobility exchange rate ceases to be a stabilizing force for the economy, but rather it becomes a target of destabilizing speculative movements and a source of asymmetric shocks (Mundell, 1973; de Grauwe, 2006). The underlying assumption which drives this argument is that foreign exchange markets are not efficient, and should thus not be trusted to guide countries towards macroeconomic equilibrium. Monetary convergence can therefore be treated as a mean to diminish asymmetric shocks arising from these inefficiencies. It can do this by stimulating integration of capital markets, and by creating better

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[87] symmetry
[88] read labor

insurance options against shock occurrences. Mundell II, as it is popularly called, is directly promoting monetary convergence and integration as means for stabilization. Finally, there is an assumption that currency areas are self stimulating, i.e. the higher level of integration is achieved in the area the more countries can coexist in it (Rwakunda, 2004).

The traditional OCA theory dominated academic discussion up until the 1992-3 ERM crisis and regained importance after the EMU was fully established. The reason to revisit the OCA theory in the integrated setting was the sustained divergence in real exchange rates among the EMU economies, with some countries losing and others gaining[89] significant amount of price competitiveness. With the exchange rate related shocks eliminated, addressing the price competitiveness becomes one of the principal concerns of the member nations. Since the ECB's policies implicitly target price stability and low inflation, the countries cannot address the issue by lowering their inflation rates below the euro average without inducing large increases in unemployment. De Grauwe argues thus that political convergence is critical for a sustainable monetary convergence process. A political union allows for the establishment of the systems of fiscal transfers which can help deal with asymmetric shocks. It also creates mechanisms for mitigating and sanctioning cases of moral hazard arising from these transfers. Finally it reduces the possibility that the asymmetry itself is political in nature. The author points out that the failures of the previous monetary convergence projects, like the Latin [90] and Scandinavian [91] Monetary Unions,

occurred primarily due to political instabilities. In contrast, the most successful monetary convergence projects in history were those which aimed to achieve political unity as well, such as the German political and monetary integration following the establishment of the Zollverein in the 19th century (de Vanssay, 1999).

Monetary convergence is advantageous if it does not reduce the members' ability to adjust to external shocks (Robson, 1998). The costs of convergence are considerably lower for countries with a sound record in managing their monetary policies. The recent developments in the Eurozone pointed this out. A number of peripheral EU economies are going through difficult reforms in the course of ESDC because they share strict EMU monetary policies (Candelon & Palm, 2011) . Combined with high capital mobility and limited labor migration this actually raised the costs of adjusting to future external shocks (Krugman & Obstfeld, 2009). The ESDC could thus be a case in point for de Grauwe's argument that sustainable monetary convergence implies necessarily a degree of political and fiscal convergence.

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[89] countries like Greece, Portugal and Spain lost, while Germany and Austria gained in price competitiveness

[90] existed from 1865 until 1927, with core economies including Belgium, France, Italy and Switzerland, later being joined by Bulgaria, Greece, Romania, San Marino, Serbia, Spain, Greece and Venezuela

[91] union between Denmark and Sweden (and de facto, Norway, which had autonomy under Swedish rule at the time). It lasted from 1873 until 1914

- Monetary Integrations

Monetary integration is a process through which deeper monetary convergence is reached in a group of sovereign economies. Monetary unions and areas are economical structures which are set to intensify cooperation by eliminating the exchange rate related risk. Cooperation is usually pre-established through preferential trade agreements, free trade areas, customs unions and/or common markets, but recently as well, through deeper financial cooperation and establishment of common bond funds. Unlike financial integration which is not necessarily institutionalized, monetary unions are developed systematically and imply centralized regulation and supervision. Central authority eventually seizes the control over national monetary policies and makes one uniformly obliging policy. A complete monetary union implies a common currency for all of its members (Ade, 2008).

Guiso et al. identify three compulsory but not sufficient conditions for successful formation of a monetary union (Guiso, Kashyap, Panetta, & Terlizzese, 1999). The first is a union-wide agreement over the ultimate goals for the common monetary policy, as the principal expression of the union's incentives. The second condition is convergence in business cycles and interest rates in the member economies. Asynchronies in these tendencies across member countries make the fulfillment of the first condition fairly difficult, if not impossible. Finally, a significant level of convergence in the operation of monetary policy transmission mechanisms is necessary for successful control and monitoring of the effects the common monetary policy has on the each of the NFSs involved. Failure to control transmission mechanisms increases the risk of sizable distributional effects which can produce strong political tensions in the integrating regions.

- Levels of Monetary Integration

Analogously to financial integration there exist several levels of monetary integration (Pattillo & Masson, 2004). The lowest level is the informal exchange rate union, where parties only agree to keep the exchange rates within specific broader margins, bilaterally or with respect to a particular 'leader' currency, e.g. the pre-euro ERM. A formal exchange rate union allows for separate currencies with rates that fluctuate in very narrow, close to zero margins, e.g. the Common Monetary Area (CMA) in Southern Africa [92]. This level of integration necessarily implies a strong coordination and cooperation between the central banks. At the highest level is the fully integrated monetary union which operates with a single currency and a single monetary policy and is managed by a single central bank, e.g. the EMU.

Monetary integrations do not have to be bilateral or multilateral. They can occur unilaterally as well, in several ways (IMF, 2006). Motivation for unilateral integration can involve: exchange rate anchoring, monetary aggregate targeting, inflation targeting or a policy framework devised within an IMF supported program. The strongest form of unilateral monetary integration is the adaptation of a foreign currency as the official currency in a country. This process is often called dollarization or euroization, by the principal currencies that are taken. It is established in a number of countries such as Ecuador, El Salvador, Montenegro and Panama. Another way is through a currency board, i.e. by backing domestic currency with foreign reserve currency and securing on demand convertibility at a fixed rate. Examples for currency boards are also numerous and include those of Bosnia & Herzegovina, Bulgaria, Denmark, Hong Kong SAR and Lithuania. A looser arrangement is that of

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[92] includes Lesotho, Namibia, South Africa and Swaziland

conventional fixed pegs in which a country pegs its currency within the margins of ±1% or lower. The monetary authority maintains the fixed parity via both direct and indirect intervention and there is no formal commitment to keep the parity irrevocably. An example is the relation most oil exporters have with the U.S. dollar, particularly the Gulf economies, e.g. Saudi Arabia (Squalli, 2011).

Pegged exchange rates arrangement within horizontal bands allow for more independent monetary policy. Under this setting, the currency is allowed to fluctuate within margins wider than ±1% around a fixed central value. The policy is pursued under the EMR II mechanism and in Hungary (IMF, 2006). A step further into monetary independence is reached with crawling pegs. Under this setting a currency is adjusted periodically by small amounts as a response to changes in a number of selected quantitative indicators, e.g. inflation differentials. Countries with this regime included Azerbaijan and Botswana. Finally, a country can choose to manage the float of its currency without a specific exchange rate path or target. This regime is called managed floating and is common in Russia and among the ASEAN economies.

An important characteristic of the level of monetary integration is the extent of asymmetry. Unilateral integrations are all purely asymmetrical since there is no shared responsibility for monetary policies and the country managing the currency does not generally take into account the needs of the other countries using its currency. The bi/multilateral integrations can be symmetric or asymmetric depending primarily on the regional distribution of economic and political power.

• Benefits and Costs

Some general benefits from joining a monetary union involve the gains in trade and in economic efficiency from eliminating transaction costs and exchange rate related risks. It also helps with the harmonization of prices, as price differentials become more noticeable across the region and can thus be more easily exploited. A single authority over the union's monetary policy should imply less irresponsibility from the member countries. A single central bank also facilitates coordination of financial markets, as the financial utilities such as payments, clearing and settlements become cheaper (Ade, 2008). Indirectly, monetary integrations allow for 'import of monetary credibility' from other member countries with reputation for prudential management of monetary policy. It has been argued that this is a considerably more efficient way to improve credibility than earning it by building an independent track record (Blinder, 2000).

Potential deficiencies of monetary integrations include primarily the costs of the exposure to an externally imposed monetary policy. Monetary policy is an invaluable tool to address issues like unemployment, recessions or inflations. Losing this tool can be very costly for a national economy that learned to heavily rely on it. Additional costs include the adjustments of each of the nations to the new currency setting, particularly the costs of governing the monetary union. These are usually split over the member nations. The split has to balance the right of every nation to have a significant share in the input side of the policy, with the ability of every nation to fund a fare share of the costs for union's institutions. The costs for the economies can also occur as the union's new currency necessarily affects the terms of trade, as well as the costs of international lending and borrowing (Rwakunda, 2004).

- Monetary Regionalism

Along with the definition of the term 'monetary union' above, a note has been made about the various types of collaboration whose establishment is considered a necessary precondition to full monetary integration. Two different possible chains of events are given there as examples. Under the first setting there is a strong assumption that a region should proceed with monetary integration only if it was primed through liberalization of regional trade. This setting is consistent with the theory of conventional, trade-based regionalism postulated by Balassa in 1960s (Dieter H. , 2000).

At the time of the theory's formulation international financial flows were not nearly as important as they are today. The barriers to trade, e.g. tariffs, were considered to be the major problem under the Bretton Woods. Conversely, capital controls were instrumental for securing the fixed exchange rates on which the system was based. However, countries started experimenting extensively with the opportunities offered by trade integration. They were either practicing openness to global markets or dissociation from them by focusing solely on their own region. The supreme regulatory act for international trade prior to the formation of the WTO, the General Agreement on Tariffs and Trade (GATT), also allowed for this. Free trade areas and customs unions were the only exceptions to the notorious Article 1, i.e. the most favored nation clause. The article essentially implied that the member countries had to provide equivalent terms of trade to all the partner economies in the act[93]. The exception of integrated regions from the act, created a strong incentive to explore the option.

Under these conditions, the integration through step-by-step trade liberalization is fairly reasonable.

These steps are: preferential trade agreement[94], free trade area, customs union, common market, economic and monetary union and in the end, political union (Balassa, 1961). Balassa's theory is in the very basis of European integrations and it has been instrumental for the establishment of regional cooperation worldwide. Half a century later, however, the global economic landscape has changed considerably. As it was discussed earlier, the dominant feature of the current GFS is the free movement of capital. Consequently, significant attention is focused on coordination of monetary policies and management of the risks to the GFS's functionality. The global trade integration has advanced and is no longer a limiting or destabilizing factor in itself. The necessity of regional trade integration prior to monetary regionalism is thus subject to academic discussion (Dieter H. , 2000).

Dieter argues that, if initiated now, the process of regional integration could start directly from the monetary regionalism and be equally, if not more successful than if the complete Balassa's scheme is implemented. This is the second setting for the establishment of a monetary union. Dieter proposes a two step prequel to the full monetary and economic union, the establishment of a 'regional liquidity fund' and of a 'regional monetary system'. The former is supposed to provide a safety net for the economies against potential crises. It would do this by pooling parts or the whole of their foreign reserves and by allowing national central banks to use these funds to stabilize their economies, when in need. Dieter sees this step to be, not only contributing to the stability of the region, but as well instrumental for reduction in costs of holding foreign reserves[95].

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[93] member nations of the WTO

[94] already accounted for by the GATT

[95] more on estimating the costs of holding foreign reserves in (de Beaufort Wijnholds & Søndergaard, 2007)

In addition, a regional liquidity fund would mean independence from the IMF funds, and would encourage macroprudential incentives in central banks. Out of the existing financial institutions in the EMU, the newly established European Financial Stability Facility (EFSF) is closest to the idea of a regional liquidity fund. One step further into integration, the regional monetary system implies introduction of exchange rate bands for the currencies operating in the region. This is a necessary buffer for the macroeconomic stabilization and consolidation of the member economies. The closest equivalent to this level in the EMU model was the European Monetary System. The two highest levels for Dieter's model are equivalent to the ones given in Balassa's.

Variations of monetary regionalism have been implemented, under external leadership, in several regions of Africa. These projects have had limited success due to the lack of political will and underdevelopment[96] (Masson & Pattillo, 2005). In modern days, monetary regionalism is particularly interesting for the Southeast and East Asia. The region suffered considerably because of its inability to borrow in local currencies during the 1997 Asian financial crisis. The countries felt overly exposed by the IMF conditioning during the turmoil. The legacy of the crisis, combined with the slow reforms of the IFA, is the most important reasons for the pursuit of monetary and financial cooperation in East Asia today (Dieter H. , 2010).

The crisis was followed by three important events. The first is the unprecedented build-up of foreign reserves in the East Asian countries. Between 1999 and 2011, the foreign reserve holdings by East Asian economies went from nearly 900 million to more than 6 billion (Dieter H. , 2010; People's Bank of China , 2011). China and Japan hold two thirds of these reserves. This endeavor has consequences for the wider global economy. Some even argue that it contributed significantly to the instability of the financial markets in the US prior to the GFC (IMF, 2010).

The second event is the establishment of a series of bilateral agreements between the 10 ASEAN countries[97], China, Japan and South Korea under the Chiang Mai Initiative (CMI). Countries established arrangements for short term swaps of local currencies for major international currencies contained in regional foreign reserves, bilaterally, and up to twice the committed amount. In 2007, the authorities agreed on the multilateralization of this arrangement, creating essentially a regional liquidity fund. The arrangement was instrumental in helping the region deal with the GFC. Both events exemplify the commitment of CMI countries to achieve region-wide financial stability and prevent speculative attacks on the regional currencies.

The third event is the creation of a common bond market which aims to facilitate the access to funds for regional companies (Chey, 2009). It does this by encouraging greater number of issuers and types of bonds and by enhancing the market infrastructure. The process advanced to the creation of the first Asian Bond Fund (ABF) in 2003, but was hampered by the weakness of financial institutions, the absence of the necessary financial infrastructure and lack of transparency. The bond fund was lunched to invest into the U.S. dollar denominated bonds by the sovereigns in eight East Asian economies[98]. A breakthrough happened when the second bond cooperation was initiated at the Executive's Meeting of East Asia and Pacific Central Banks

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[96] for more information see next section

[97] members of ASEAN are: Brunei Darussalam, Cambodia, Indonesia, Laos PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam

[98] China, Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore and Thailand

(EMEAP). The member counties agreed to invest in domestic currency denominated bonds issued by sovereign and quasi-sovereign issuers in the same eight economies. The EMEAP is important because it widened the East Asia's perspective to include Australia and New Zealand in the regional financial agreements. The central bankers of the largest economies of the EMEAP have taken active steps towards deepening financial markets and creating conditions for better long run risk management. Politically, the exclusion of the U.S. from this cooperation indicates the determination to develop an independent financial structure. A direct U.S. response can be noted in the political background of the American proposal for a Pan-pacific free trade agreement (Banyan, 2011).

On the other hand, regional politics act as critical barriers to deeper cooperation on monetary and financial regulation. The competition between China and Japan for the regional leadership is the principal impediment. Another drawback is the regional variety in the forms of governance. Five of the economies are constitutional monarchies, five are republics, three are communist states, three are states with limited democracy and one is a nominal civilian parliamentary government. The political heterogeneity is thus a real challenge for any kind of formal transition from cooperation to convergence. Bird et al. argue that political will is the crucial motivator towards both monetary and trade regionalization, as well as for their chronological sequencing (Bird & Rajan, 2005). Accordingly, it is not likely to expect an EMU type union to emerge out of the CMI. Rather, the region is likely to experiment with the various forms of monetary regionalism while simultaneously promoting financial integration. The process is critically dependent on the future Chinese incentives towards financial openness.

- Monetary Integration Projects

The extensive discussion of financial and monetary integrations is concluded here by listing the regions which have completed, initiated or argued the issue of monetary integrations, and by characterizing more generally the monetary integration projects. As stated earlier, the absolute leader in the process of regional economic, monetary and financial integrations remains the European Economic and Monetary Union. Monetary integration is an ongoing process within the EU. The process raised considerable leverage for the EU as an entity, and thus arguably reduced the hegemony of the U.S. in the global financial affairs (Posner, 2010). Rapidly after its introduction, the EMU's currency – euro became the second most important reserve currency, accounting at times for more than 20% of all foreign reserves holdings.

The EMU developed through three stages (EC, 2009). Before 1994 all capital controls within the European Economic Community[99] were abolished and the Maastricht Treaty was ratified, specifying the economic convergence criteria for joining in. From 1994 till 1998, the European Monetary Institute was established as a forerunner of the ECB, to stimulate monetary cooperation between the 11 central banks. A new exchange mechanism (EMR II) was imposed to provide stability between the future common currency and the currencies of the EU economies that are not in the monetary union. The Stability and Growth Pact was designed in addition, to guarantee budgetary discipline following the introduction of the single currency. In 1999 the euro was introduced as a virtual currency under the ECB's authority, marking the start of the stage three of the process. All subsequent entries required the fulfillment of conditions from the

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[99] later renamed the European Community

Maastricht Treaty and successful management of the EMR II for more than two consecutive years.

The EMU has, however, shown great weakness since the beginning of ESDC and its future is fairly uncertain (OECD, 2012). Under the current setting, 17 countries are integrated and will aim for even deeper, fiscal integration, in order to stabilize their economies. The core of the union is the block encompassing Benelux, France, Germany and Italy. Initially peripheral economies included Austria, Finland, Ireland, Portugal and Spain. Greece joined in 2001, taking the last chance to be a founding nation of the project. Since the formal introduction of the euro in 2002, the membership was extended to Slovenia in 2007, Cyprus and Malta in 2008, Slovakia in 2009 and Estonia in 2011. Ten other economies [100] consider adopting the euro in the future, if the currency is not dropped all together in the ESDC aftermath. The unilateral monetary integrations with respect to the euro are also extensive. They appear in all forms, from eurizations, over currency boards, to conventional and crawling pegs, and they extend far beyond the European continent. The ECB's monetary policies are thus systemically important for a large fraction of the GFS.

Apart from the EMU, other already established monetary unions[101] are the Economic and Monetary Community of Central Africa (CAEMC) [102], the West African Economic and Monetary Union (WAEMU) [103] and the East Caribbean Currency Union (ECCU)[104]. The Common Monetary Area in Southern Africa transformed from a monetary union into a formal exchange rate union, as the smaller member economies started issuing their own currency. All of the given unions are communities of ex colonies.

The CAEMC and WAEMU together with Comoros make the CFA [105] franc zone (Masson & Pattillo, 2005). Bank of France guarantees the parities of all three regional currencies to the euro. The French commitment to maintain the parity is what preserved the CFA area since 1945. The regions are therefore, in structural sense, direct dependencies of the euro, with strong limitations upon their central banks' practices of independent monetary policies. What allows for de facto independence is the limited capital mobility in the regions. This is to say that neither official interest rates nor money markets track exactly their equivalents in the Eurozone. In fact, the interest rates are necessarily higher in the CFA zone because of insufficient credibility.

Contrary to what is experienced in the EMU, monetary integration did not bring about substantial financial integration to these regions. The unions de jure allow for the integrated banking sectors but protectionism for national banks remains high. Furthermore, monetary programming for each of the regions is centrally determined, but on country-by-country basis. The region-wide crisis from 1986 till 1993 and the consequent efforts to stabilize the economies resulted in gradual elimination of monetary financing of the treasuries of each of the

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[100] out of the 10 remaining members of the EU, Denmark and the U.K. opted out from the monetary union. Denmark left a constitutional option of holding a referendum towards entry (Bernstein, 2009). Eight other economies are expected to enter upon the fulfilment of the macroeconomic requirements (EC, 2011). Future entrants, Croatia and Iceland are also expected to adopt the euro.

[101] for a historical coverage see (Chown, 2003)

[102] CAEMC members are: Cameroon, Central African Republic, Chad, Equatorial Guinea, Republic of Congo and Gabon

[103] WAEMU members are: Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo

[104] East Caribbean Currency Union (ECCU) includes the island countries/dependencies: Anguilla, Antigua and Barbuda, Dominica, Grenada, Montserrat, Saint Kitts and Nevis, Saint Lucia and Saint Vincent and the Grenadines

[105] Communauté financière Africaine

economies. Transition towards independent central banking was [106]completed in the WAEMU by 2003 and is ongoing in the CAEMC (Bénassy-Quéré & Coupet, 2005; v. d. Boogaerde & Tsangarides, 2005). The process is expected to give the two CFA central banks the power to set refinancing targets for the entire regions and have lending arrangements with commercial banks regardless of their location.

Trade integration was also considerably more successful in the WAEMU than in the CAEMC. The interregional trade is several times more intensive in the WAEMU than expected from the basic gravity model, while in the CAEMC it is generally below or merely approaching these estimates (Masson & Pattillo, 2005). Some point out the fundamental difference between the two regions, the CAEMCs being largely oil producers and WAEMUs being oil importers, as the principal reason for their respectful convergence prospects (Qureshi & Tsangarides, 2008). The underlying argument is that CAEMCs are more prone to the volatility in commodity prices and therefore more individually volatile. The CFA francs have unambiguously delivered better price performance than other exchange rate regimes in Africa[107], and have allowed for lower inflation than in the rest of Sub-Saharan Africa. The danger of recurring overvaluation of CFA francs persists, particularly in the periods when the euro is strong against the U.S. dollar (Masson & Pattillo, 2005). For both regions and their individual members, France is the most important international trading partner. The same holds for the provision of financial services. In that aspect, regional economies remain more financially and monetary integrated with France than with each other, even after six decades.

As ex-colonies, the members of the ECCU have also had a long tradition of fixed exchange rates to foreign currencies (van Beek, Rosales, Zermeño, Randall, & Shepherd, 2000). Unlike the CFA area economies, the members of the ECCU are small open island economies, with limited diversification and high vulnerability to external shocks. They have maintained the peg to the U.S. dollar since the 1976. Political and economic cooperation in the union was institutionalized by establishing the Organization of Eastern Caribbean States in 1981 and the Eastern Caribbean Central Bank in 1983. The ECCU is the only currency union where the member countries pool all of their foreign reserves together to back up the peg. The convertibility of the common currency is fully self-supported and the exchange parity preserved since it was first established. The small market size is a drawback for the union, and so is its fragmentation into islands. The ECCU economies are frequently exposed to natural disasters, particularly hurricanes. Small market size makes the impact of disasters far more economically devastating that it would be for larger economies. ECCU serves therefore as a stabilizing framework, in spite the limited diversification.

The CMA existed in various forms ever since the establishment of South African Reserve Bank (SARB) in 1921. It gained its current structure in 1986 when the smaller member economies started issuing independent currencies. Unlike the CFA franc areas and the ECCU, the CMA is characterized by a strong asymmetry. Dominant South Africa retains the power to set the monetary policy for the overall region. Smaller economies act like satellites and import South African monetary policy to facilitate trade. The CMA requires thus macroeconomic coordination only in regard to monetary arrangements and the customs union[108].

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[106] at least de jure
[107] with the notable exception of Botswana

[108] CMA is a part of the larger Southern African Customs Union (SACU), which also includes Botswana.

There is also no need for explicit constraints in fiscal policies, as smaller economies do not have the access to monetary financing from the SARB. For the smaller CMA economies it makes economic sense to share credible monetary policy of an important neighbor and a principal trading partner. The longevity of the liaisons, however, is likely to be due to the willingness of South Africa to accommodate its monetary policy to the needs of its neighbors as well (Masson & Pattillo, 2005).

The EMU remains the role-model for monetary integrations, in spite the crisis occurrence. Following its establishment, large scale monetary integrations have been proposed in many of the existing trade areas, political associations, common markets, and regions with similar cultural and language background. Some examples are MERCOSUR[109], CMI, SAARC[110], ECOWAS[111], GAFTA[112], NAFTA[113], with principal drives being regional politics, security concerns, gaining bargaining power, commitment mechanisms for trade and reform measures. (Hochreiter, Schmidt-Hebbel, & Winckler, 2002; Park & Wyplosz, 2008; Kima, Ryoub, & Takagi, 2005; Jayasuriya, Maskay, Weerakoon, Khatiwada, & Kurukulasuriya, 2005; Tsangarides & Qureshi, 2008; Romagnoli & Mengoni, 2009; Sturm & Siegfried, 2005; Chriszt, 2000; Gilbert, 2007). For many of these projects the ambition remains far out of reach, either because of

the lack of political will or because of juxtaposed economic incentives of individual members. Interestingly, the bare incentives managed to generate plethora of interesting analytic results, relevant not only for understanding future monetary integration projects, but also for envisioning the functioning and reformation of the modern IMS.

The table below displays some key properties of the five existing monetary/currency unions and a number of other monetary projects which surpassed the purely theoretical framework and produced some results towards integrations. Monetary integrations are generally negotiated among adjacent countries with similar level of economic development (e.g. advanced economies in the original EMU), similar political systems (e.g. monarchies in the GCC[114], republics in the EAC[115]) and/or similar economic incentives (e.g. resource based GCC and CAEMC). Both trade-based and monetary regionalisms occur, as a consequence of the fact that many of the emerging economies neglected for a long time their regional markets and traded exclusively with the advanced economies.

While trade-based regionalisms generally aim to promote intra-regional development and collaboration, monetary regionalism tends to be motivated in relation to external parties. In a number of cases, monetary regionalism is pursued to facilitate extra-regional trade (e.g. in the GCC, the CFA area, the ECCU), while in some it aims primarily at reaching independence from specific foreign authorities (e.g. the ALBA from the U.S.). Additionally, the idea of monetary regionalism appears to be gaining momentum, with the evident need to have more stable currencies in the

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[109] MERCOSUR includes: Argentina, Brazil, Paraguay, Uruguay; Venezuelan membership awaits ratification
[110] South Asian Association for Regional Cooperation (SAARC) includes Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka
[111] Economic Community of West African States (ECOWAS), which includes the WAEMU, the former British colonies in West Africa, as well as Gambia, Liberia and Cape Verde;
[112] Greater Arab Free Trade Area (GAFTA) includes Algeria, Bahrain, Egypt, Iraq, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, the United Arab Emirates, Yemen
[113] North American Free Trade Area (NAFTA) includes Canada, Mexico and the United States of America

[114] for the GCC governance appears that important that even a remote country such as Morocco is more likely to become a member that the neighboring Yemen, because it is a monarchy
[115] East African Community members are Burundi, Kenya, Rwanda, Tanzania and Uganda

developing countries. An interesting feature is that all of the BRICS have actively pursued leaderships in some form of regionalism, Brazil with MERCOSUL, Russia with the Euro-Asian Union[116], India with the SAARC, China with the CMI, and South Africa already has the CMA. As for the organizational structure, majority of the projects rely on the leadership of a centrally positioned, highly developed economy or a group of economies. The relation with the core economy is particularly strong if it is possible to 'import' its monetary policy credentials (e.g. Germany, South Africa).

An interesting exception is the West African Monetary Zone (WAMZ) [117] project where the leading economy, Nigeria is not geographically central to the union and also harbors different economic incentives to the other members, as an oil exporter. Bénassy-Quéré and Coupet show in their clustering analysis that while convergence between Gambia, Ghana, Guinea and Sierra Leone and their further consolidation with the WAEMU countries are both desirable, monetary integration with Nigeria is strongly discouraged. Bénassy-Quéré and Coupet show that Nigeria is closer in terms of its macroeconomic characteristics and incentives to the CAEMC economies like Congo and Gabon (Bénassy-Quéré & Coupet, 2005). Analogous results have been obtained by Qureshi and Tsangarides (Qureshi & Tsangarides, 2008).

Another exception is the EAC which is composed of a group of codominant economies, all without a strong record in monetary policies. The community has, however, a long history of regional cooperation and a strong incentive to eventually reach political unity (EAC, 2011). Convergence is proceeding rapidly, under an ambitious agenda. The actuality of the EAC integrations prompted a number of analyses on the appropriateness of monetary integration in the region. An important result is the work by Buigut and Valev whose model shows that multilateral monetary union has the capacity to enhance monetary stability in its member stats even if none of them have a history of prudent independent monetary policy (Buigut & Valev, 2009). The analysis focuses on the conflicting needs of the political entities in different member states and treats any benefits from the independence of the common central bank from national authorities as supplementary. It contributes to the previous clustering analyses on monetary integrations by taking into account also the credibility effects of the integrations.

The progress of the individual monetary integration projects is difficult to estimate. Some economies, like the members of WAMZ, find it very difficult to reach a specified level of convergence (Onwioduokit, Jarju, Syllah, Yakubu, & Jarrett, 2010). This occurs in spite a strong institutional framework which is implemented to coordinate the convergence. On the opposite end of the spectrum, the GCC succeeded to reach a remarkable level of convergence without de facto needing any common institution to provide coordination (Kamar, 2004). Finally, due to the intricacy of the integration processes, individual economies may become additionally vulnerable to speculative attacks, external shocks and to disruptions in fellow member economies. Such is the case of the EMU, with the ESDC. Alternatively, crisis can in itself inspire convergence and collaboration (e.g. Asian crisis and the CMI, 1986-1993 crisis and WAEMU). Regional monetary integration processes are important because of their impact on financial integration in developed economies and more attention should be placed on their analysis.   .

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[116] Euro-Asian Union comprises Russian Federation, Kazakhstan and Belarus (SPIEF, 2011).
[117] WAMZ members are: Gambia, Ghana, Guinea, Liberia, Nigeria and Sierra Leone

Monetary Integration Projects								
Projects	type of countries	integration approach	level of integration achieved	organization	motivators	common currency in the IMS	secondary integrations	crisis events
European Economic and Monetary Union (EMU), since 1990	advanced and developing economies	trade-based regionalism until 1990; monetary regionalism onwards	full monetary union, complete capital liberalization, ESM from 2013	leader – Germany, core - Benelux, France and Italy; periphery	competition with the U.S. and the BRIC; internal consolidation	2nd most important reserve currency	extensive; only in Europe 5 currency boards, 2 eurizations; 5 other economies to join; CAEMC and WAEMU pegs	the ERM crisis in 1992, the European sovereign debt crisis, 2009 – present
Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, Spain								
Economic and Monetary Community of Central Africa (CAEMC), since 1945	Cameroon, Central African Republic, Chad, Equatorial Guinea, Gabon and the Republic of Congo							
Economic and Monetary Community of Central Africa (CAEMC), since 1945	developing economies, largely oil producers	neocolonial, externally imposed monetary regionalism	single currency, single central bank, centralized monetary programming for individual nations, limited flows of capital	external coordinator – France; no internally prevailing economy	trade arrangements with France	CFA franc zone; peg to euro managed by the Bank of France	none	1986-1993 crisis, numerous national political crises
West African Economic and Monetary Union (WAEMU), since 1945	developing economies	equivalent to the CAEMC; trade integration in progress	equivalent to the CAEMC; central bank has greater independence; better capital flows	external coordinator – France; no internally prevailing economy	trade arrangements with France	CFA franc zone; peg to euro managed by the Bank of France	with the WAMZ makes the ECOWAS[118]	1986-1993 crisis, numerous national political crises
Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo								
West African Monetary Zone (WAMZ), since 2000	developing economies, 1 (oil producing) emerging economy	post-colonial, trade aided monetary regionalism	an ERM established, with a coordinating monetary institute	dominant economy – Nigeria	competition and/or consolidation with the CFA franc zone	likely to be adjusted to euro or the U.S. dollar, depending on Nigerian input	with the WAEMU makes the ECOWAS	frequent national political crises
Gambia, Ghana, Guinea, Liberia, Nigeria and Sierra Leone								
South African Common Monetary Area (CMA), since 1986[119]	developing countries, including one of the BRICS;	post-colonial; trade-based regionalism;	a formal exchange rate union; Southern African Customs Union; smaller economies import the SARB's monetary policies	dominant economy – South Africa	intra-regional trade	South African rand is a floating currency	Namibia (unilaterally)	national political crises
Lesotho, South Africa and Swaziland								

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[118] the Economic Community of West African States
[119] existed effectively in various forms ever since the establishment of SARB in 1921

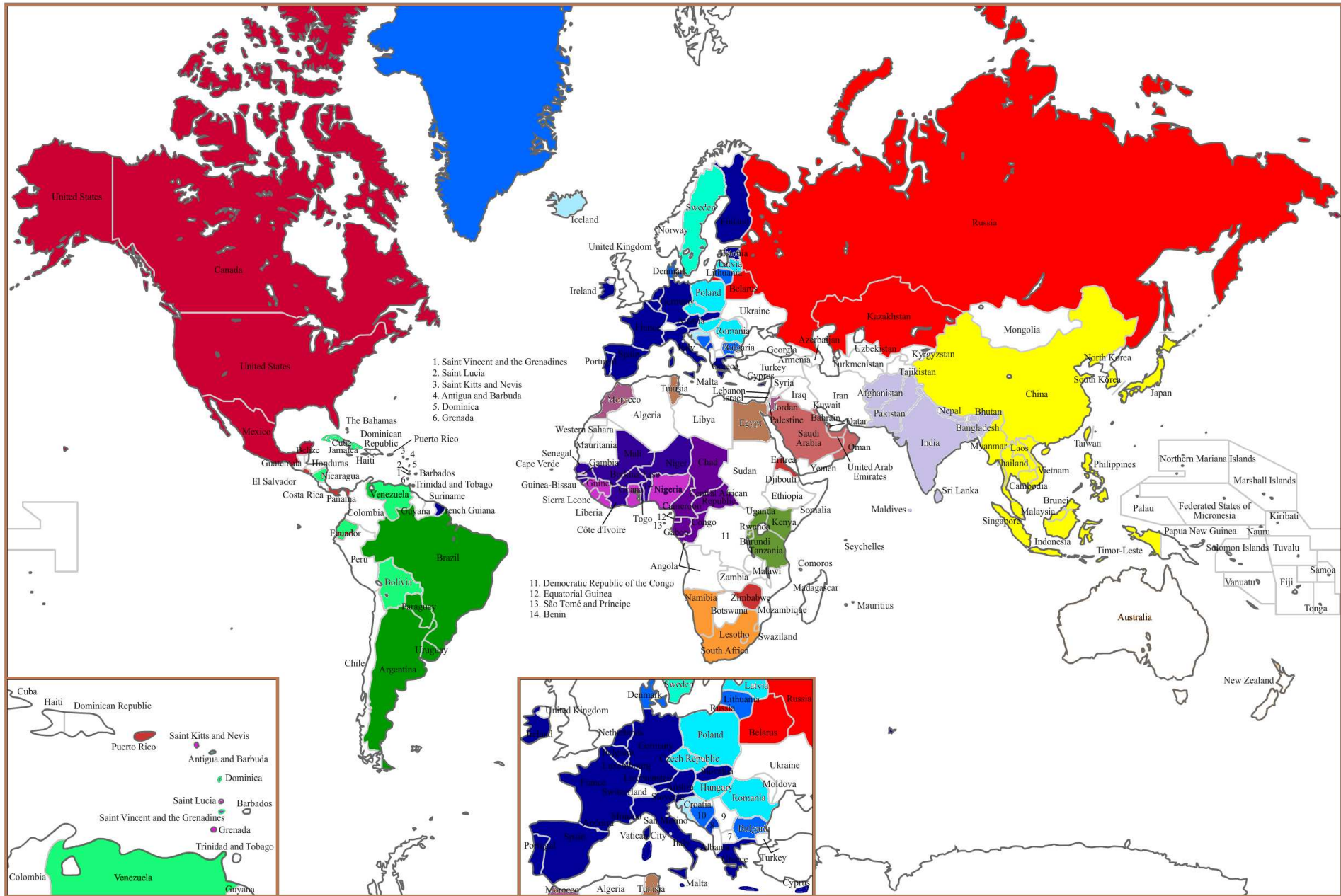|								
East African Community (EAC), since 2000	developing countries	post-colonial; trade-based regionalism; federalization	customs union; agenda exists for common market, monetary and political union	leaders – Kenya, Tanzania, Uganda;	intra-regional trade	to be pegged to euro	South Sudan to join	frequent national political crises
	Burundi, Kenya, Rwanda, Tanzania and Uganda							
East Caribbean Currency Union (ECCU), since 1965	developing countries	post-colonial; monetary regionalism;	full monetary union; all individual foreign reserves pooled together to back the peg	no dominating economies	service industry arrangements with the U.S. and the EU	peg to the U.S. dollar	none	
	Anguilla, Antigua and Barbuda, Dominica, Grenada, Montserrat, Saint Kitts and Nevis, Saint Lucia and Saint Vincent and the Grenadines							
Cooperation Council for the Arab States of the Gulf (GCC), since 1981	emerging economies; oil producing monarchies	political cooperation; trade-based regionalism	a remarkable degree of monetary convergence, non-institutionalized; common market	leader – Saudi Arabia; two distinct groups by production diversification	political stability; oil exports arrangements;	individual pegs to the U.S. dollar	Jordan and Morocco invited; Yemen	
	Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates							
South East Asian Monetary Cooperation, since 1999	all degrees of development present; various forms of governance; one of the BRICS	monetary regionalism	multilateral arrangement for swaps of foreign reserves	leadership contenders – China and Japan; groups: ASEAN vs. China, Japan and Korea	regional financial stability and independence	unclear, but certainly a reserve currency	financial integration with Australia and New Zealand	Asian crisis 1997-8
	Brunei Darussalam, Cambodia, China, Indonesia, Japan, Laos PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand the Republic of Korea and Vietnam							
Euro-Asian Union, since 2011	emerging and developing countries; one of the BRICS;	political cooperation; trade-based regionalism	customs union; Euroasian Commission as the regional equivalent to EC	leader – Russia	global competitiveness of the region	unclear	Kyrgyzstan and Tajikistan	USSR collapse; Russian crisis 1998
	Belarus, Kazakhstan, Russia							
Common Southern Market (MERCOSUL), since 1991	emerging and developing countries; one of the BRICS	trade-based regionalism	customs union	leadership contenders – Argentina and Brazil	global competitiveness of the region	unclear	Venezuela (blocked by Paraguay)	Argentinean crisis 2001; other post Asian crisis vulnerabilities
	Argentina, Brazil, Paraguay, Uruguay							
Bolivian Alliance for Americas (ALBA), since 2004	developing countries	political cooperation; monetary regionalism	virtual currency	leadership contender – Venezuela	economic and political independence from the U.S.	unclear	none	
	Antigua and Barbuda, Bolivia, Cuba, Dominica, Ecuador, Nicaragua, Saint Vincent and the Grenadines and Venezuela							

Figure 4: The regions which have completed, initiated or are discussing monetary integrations: (from left to right) NAFTA (bordo red), ECCU (very light green), ALBA (light green), MERCOSUL (dark green), EMU (dark blue), in decreasing shades of blue: unilaterally adopted euro, currency boards to euro, expected to adopt euro in the future, have an opt out option; Agradir (brown), GCC (dark pink), countries in negotiation with both Agradir and GCC (darker pink), WAEMU (dark purple), CAEMC (purple), WAMZ (pink), EAC (olive green), CMA (orange), Euro-Asian Union (red), Chiang Mei (yellow), SAARC (light purple), countries which unilaterally adopted US dollars (dark red); map does not feature South Sudan and Kosovo as separate economies

Summary	Monetary Integrations			
Function	strong monetary convergence between sovereign economies; intensification of economic interaction by eliminating exchange rates risks			
Motivators	freedom of movement of capital & international politics	**Type of process**		systematic
		explanation		**example**
Levels	**multilateral**	informal exchange rate union	exchange rates kept within specific margins	ERM
		formal exchange rate union	exchange rates fluctuate in very narrow margins	CMA
		monetary union	a single currency and a single central bank	EMU
	unilateral	dollarization/eurization	adopting a foreign currency	Montenegro
		currency board	explicit commitment to exchange domestic currency at a fixed rate	Denmark
		peg / peg with horizontal bands	exchange within margins of ±1% / close but wider margins	GCC / Hungary
		crawling peg	periodical adjustments in small amounts	Botswana
		managed float	Influencing the exchange rate without a clear target rate path	Russia
Steps for Establishment	**trade-based regionalism**	**trade integration**	free trade area	internal barriers to trade removed, heterogeneous external barriers persist
			customs union	adaptation of common external tariffs
			common market	freedom of movement for labor, services and capital
		monetary integration	economic and monetary union	a common currency and harmonization of policies
	monetary regionalism	**regional liquidity fund**	pooling regional foreign reserves and allowing their usage for stabilization purposes	
		regional monetary system	introduction of a regional system of exchange rate bands	
Benefits	elimination of transaction exchange rates related costs, price harmonization, better micro and macroprudential policies, facilitates coordination of financial markets and utility systems, "import of credibility"			
Costs	independent monetary policy, adjustment costs, costs of governing and participation in regional funds and institutions, change in terms of trade, interdependencies and spillover effects, costs of macroprudential supervision			

Monetary Policies vs. Financial Integration

→	**macroeconomic policy trilemma**		←
four transmission channels	communicating a different exchange rate from the one that is practiced	alters the space of operation of monetary policies	market discipline, stabilization of inflation, reduced costs of borrowing
direct interest rates	**international monetary policies**		
domestic asset prices	**single**	**cooperation**	**convergence**	**IMS**
exchange rate regimes	matters less; exception FED which has a systemic effect on the GFC	substantial gains for open economies	stimulates regional financial integration and external diversion	mixed; requires reform
availability of credit				

2.4. Systemic Crises on the GFS

- Systemic Risk & the GFS

A comprehensive definition of systemic risk in financial systems is given by Schwarz in his 2008 review, and it goes as follows:

"the risk that an economic shock such as market or institutional failure triggers (through a panic or otherwise) either

(x) the failure of a chain of markets or institutions or
(y) a chain of significant losses to financial institutions,

resulting in increases in the cost of capital or decreases in its availability, often evidenced by substantial financial-market price volatility" (Schwarcz, 2008)

Schwarcz's contribution is in the acknowledgment that the institutional systemic risk and market systemic risk should not be addressed each in isolation. In modern financial systems, systemic disturbances can arise outside the international banking system anywhere in the capital-market, and can spread equally through the capital-market linkages and banking relationships. Similarly, a profound disturbance in an important financial institution can cause severe market interruptions. This is because of the need of this institution's counterparties to all simultaneously close out their positions. The perspective reveals that the business and legal characterizations of financial institutions are far less important for the estimate of systemic risk than whether this institution is a critical intermediary, involving both a large number of counterparties and a large overall exposure.

The analysis of the systemic risk should thus have an integrated perspective. It should balance the focus of regulation between the parts of the financial system which have the highest stake in its structure and the parts that appear to be exposed the most. This is to say that with an increase in disintermediation systemic risk should be estimated primarily through the effects on the markets, whereas in an opposite trend, the estimates should focus on the exposure of the critical intermediaries (Schwarcz, 2008).

Simultaneously, the analysis should be able to rely on adequate, objective signaling mechanisms which could point out the instabilities in a timely manner. Direct signaling has however acted to increase the market volatility and uncertainty. To take the obvious example of the CRAs, the real-time downgrades have acted to polarize the markets to the extent that considerably narrowed the policy windows of national authorities (de Haan & Amtenbrink, 2011). Authorities, used to lengthily negotiations and slow adjustments, still lack mechanisms to provide an efficient reaction. In the internal management though, it is important to note that, for a policy design. the optimal level of systemic risk is not a zero level (Kambhu, Schuermann, & Stiroh, 2007). A policy which aims to completely eliminate systemic risk would come at the cost to efficiency of the financial system and would even be suboptimal from a social perspective. Kambhu et al. argue that optimal levels of systemic risk require a better cost-benefit analysis from the currently available ones, and indicate that policymakers should focus on inefficient systemic risk that is exceeding some commonly agreed socially optimal levels.

Schwarcz adds two clarifications to his definition. First is that systemic risk is an economical and not a political term and it should not be used to characterize just any large financial downturns. Second is that systemic risk should not be confused with systematic risk, as it often is the case.

In finance, systematic risk[120] is a risk from the downturns that are caused by agents' exposure to common macroeconomic factors. Some general contributors to systematic risk are recessions, wars and swings in interest rates. Examples of events which are accounted by systematic risk also include fluctuations in fast expanding markets. Namely, under this setting investors can reach the state of over-indebtedness at which capital flows are insufficient to service their liabilities. Distressed selling can occur as a result. The event is accounted for by systematic risk, but its consequences can further on trigger a systemic disruption. As a risk inherent in the aggregate market, systematic risk cannot be addressed through diversification. It is therefore the opposite of idiosyncratic risk, which is the risk specific to a firm, an industry or a particular investment opportunity. Systematic risk can, however, be hedged via future contracts.

In general terms idiosyncratic, systematic and systemic risks are gradated according to respectful probabilities and the magnitude of portfolio losses which they imply. Events accounted for by idiosyncratic risks are to some extent predictable and in, general, lead to manageable losses in well diversified portfolios. Systematic risk covers the events that are much less predictable and incur higher portfolio losses for the involved parties. Schwarcz points out that some of these events are important market mechanisms which facilitate the market equilibrium, by restraining excessive interest rates and inflation periods. Systemic risk, finally, accounts for highly unlikely and strongly disruptive events in the financial systems, which incur substantial losses for even the most prudential and well diversified among the agents. In its strictest interpretation, systemic risk would account for a collapse of a substantial part of the financial system infrastructure.

Schwarcz's definition is much less restrictive and reduces to the risk of financial contagion, either via markets or exposures between various financial institutions. This is where the distinction from systematic risk becomes hard to pinpoint, since an event can be systemic for one part of the financial system, while its externalities can be systematic for the rest. The latter is particularly true if the GFS is observed. In an early addressing of the issue Bordo et al. point out a distinction between real and pseudo-systemic risk[121] in international finance, but also between the contagion process and the transmission process, and, equivalently, between contagion and currency crises (Bordo, Mizrach, & Schwartz, 1995).

The authors argue that, while comprehensible at the national level, systemic risk is an elusive concept in international terms. They reach this conclusion by reviewing international crisis events and by pointing out that, in the majority of cases, these events were incurring systematic risk upon the economies which are not at the very origin of the crises. Moreover, the international spread of instabilities tends to work via transmission channels which are distinct from contagion. Namely, transmission channels are supposed to account for the fact that fundamentals in different countries are linked through the current and capital accounts of the BOPs. A true contagion would therefore require that shocks in different countries are linked independently of their fundamentals. As such, it could be a source of systemic risk if it interrupts the payments system and if it is not dealt with properly by the monetary authorities[122]. Accordingly, contagion crises should be differentiated from currency crises[123]. Currency crises involve speculative attacks on a currency of a country pursuing unsustainable monetary and fiscal

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[120] also known as the market risk

[121] which is equivalent to the notion of systematic risk
[122] lender of last resort
[123] the distinction was originally made by (Krugman P. , 1991)

policies, while a contagion crisis occurs when investors, for rational or irrational reasons, rush to convert assets into liquidity.

Bordo et al. point out that other potential sources of systemic risk have emerged with the financial development between 1970s and 1990s. These are notably international banking, capital market integration, securitization, usage of derivatives and comovement in stock markets. With their advance, the distinction between systemic and systematic events in global finance becomes ever harder to discern. As a consequence, it also becomes increasingly difficult to determine whether a financial institution/structure is truly systemically important, or should its default be treated as a natural course of things. Schwarcz's definition treats systemic risk as an externality, and consequently, there is a classical rationale for government intervention. At the international level, there is, however, no such thing as global governance or international lender of last resort (ILOLR)[124]. For a long time, an international financial event was treated as systemic primarily if it would endanger the financial systems of the advanced economies. The last two major crisis events, the GFC and the Asian crisis testify to this claim.

Schwarcz's overall argument is inspired by the 1998 FED's rescue of the Long Term Capital Management (LTCM) fund, a large speculative hedge fund which operated in the U.S. until early 2000. The LTCM got into trouble in the midst of the market irrationality in bond pricing following the Russian sovereign default in August 1998. The fund lost more than $ 4 billion in a period of four months in spite being engaged in a well diversified and protective hedging strategy[125]. FED's officials

feared that the LTCM's default would create a panic and that a number of credit and interest rate markets would cease to function for a period of several days, creating a contagion. Schwarcz identifies the near-failure of the LTCM as the first crisis that shows the changed nature of systemic risk which motivated his definition. On the other hand, the LTCM is just one of the outcomes in a year plentiful with crisis events, all around the developing world. The Russian default, which triggered the LTCM's problems, was caused by a mix of internal and foreign pressures on the Russian economy. Essentially, fiscal deficit, mounting interest rates and unfavorable public debt structure in Russia met the worldwide ripple effects of the East Asian crisis (Kharas, Pinto, & Ulatov, 2001).

What essentially started as a currency crisis in Thailand in summer of 1997, rapidly developed into a crisis of confidence from investor's side, creating a space for speculation over new currency crises and endangering a great number of adjacent economies. Even the developing countries with well established private sectors and sound macroeconomic records, such as the infamous 'East Asian tigers'[126], were in dismay (Kharas, Pinto, & Ulatov, 2001). This is to say that, largely due to the asymmetry of information, and because of the capital market integration, investors from developed countries suddenly considered a great number of developing economies equally unsafe and were not looking to stay. On the regulators' side, the crisis evolved into a management crisis of international financial flows, with Malaysia openly defying the IMF's conditions and recommendations as inappropriate and pursuing capital controls. (Steinherr, Cisotta, Klär, & Šehović, 2006). Credibility pressure soon extended to other

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[124] though IMF has at times performed this function (IMF, 2011d)
[125] the board of directors included the two 1997 Nobel Prize winners, R.C. Merton and M. Scholes, who received the prize

for their new method for pricing of derivatives (The Nobel Foundation , 1997)
[126] Hong Kong, Singapore, South Korea and Taiwan

developing economies with capital account convertibility, like Brazil and Russia (Evangelist & Sathe, 2006; Konaç, 2000). The pressure was amplified by the disruption of the trade channel, as the demand for goods and services produced in developing countries weakened considerably. The result was a sharp drop in prices of commodity goods, impacting heavily the exporters of oil and other raw materials. In Russia the mix of this effect and a series of speculative attacks, eventually led to a sovereign default. The default spread the crisis onto the entire ex-Soviet region and sent a ripple back to some of the major international investors, e.g. the LTCM.

The crisis in the example was not purely financial and in terms of Bordo et al. it was a contagion only occasionally. However, it involved literally all types of agents there were in the GFS at the time. It reached four different continents within one year period and it called upon a compulsory revision of the IFA (Claessens & Underhill, 2010). The shock was spreading interchangeably through financial markets and institutions, but equally so via the transmission channels linking the fundamentals of different economies. This is exactly the type of crisis which the 2001 IFA and Basel II agreement should have accounted for, but the GFC proved them flawed. It became evident since that in order to manage the systemic risk for the GFS an entire set of risks must be prudentially managed.

In 2007 the IMF introduced the Global Financial Stability Map (GFSM) into its annual Global Financial Stability Report. The GFSM is a complementary analytical tool which allows for a graphical interpretation of changes in risks and conditions that impact the global financial stability (Dattels, McCaughrin, Miyajima, & Puig, 2010). It is as well, a comprehensive example of the modern approaches to systemic risk in the GFS.

The basic scheme of the GFSM is given in Figure 5 below. The GFSM is a starting point for a stability analysis, and reflects the notion that financial stability is better understood by separating the estimates of the underlying risks and conditions[127]. The number of chosen indicators per estimate is ideally between 4 and 8, as otherwise there is too little information or too much correlation between the factors. The indicators should be separable, distinct and statistically relevant. The risks are then estimated as functions of the indicators. Standard setup of the GFSM includes the following risks: macroeconomic risk, emerging market risk, credit risk, market risk and liquidity risk. The GFSM also accounts for the roles of monetary policies, financial conditions and the investors' behavior in the build-up of imbalances detrimental for a systemic event.

The rays of the GFSM comprise the relevant indicators for each of the risks and conditions with equal weight. The results are consequently scaled,
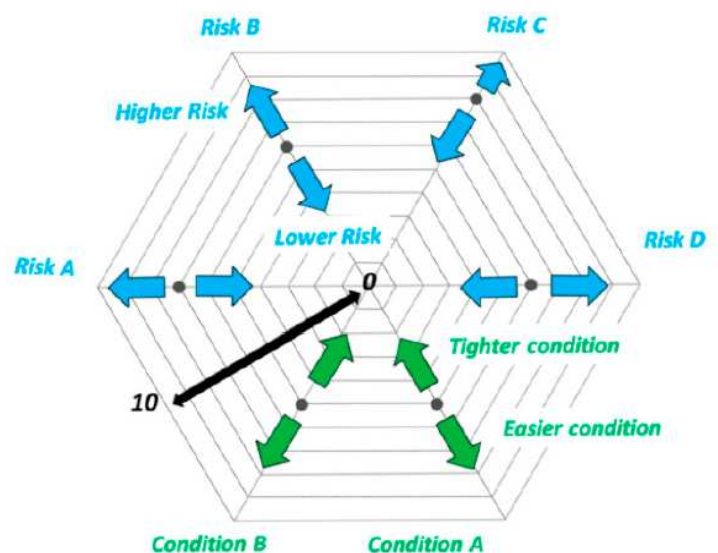

Figure 5: The scheme for the Global Financial Stability Map. The risks (in blue) are leveled against the conditions (in green) on scale from 0 to 10 (Dattels, McCaughrin, Miyajima, & Puig, 2010)

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[127] the estimates should, in principle, be valid at least over the course of 6 months

with higher values implying higher risks, looser monetary and financial conditions and stronger risk seeking behavior. The values are, moreover, compared to the indicators' historical values, as shown in the Figure 6. Here the development of the GFC is presented along with its effects on the risks and conditions within the financial system. It is easy to follow how loose monetary and financial conditions along with a considerable appetite for risks eventually stimulated the build-up of highly destabilizing risks in other aspects of the GFS's functioning.
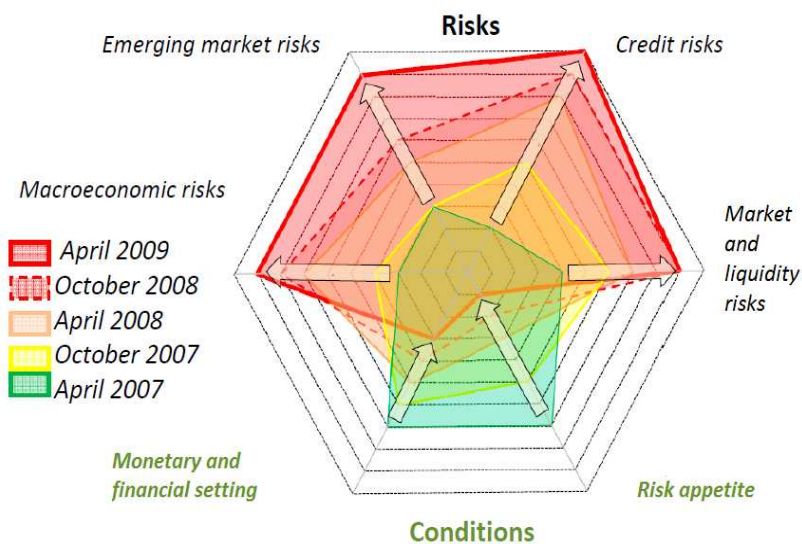

Figure 6: GFSM for the GFC escalation period (Dattels, McCaughrin, Miyajima, & Puig, 2010).

Finally, modern notions of systemic risk necessarily include the effects of asymmetry of information which arise with creation of the LCFI. The lack of transparency and the abundance of complexity which characterizes the activities of these institutions necessarily challenge the positions and incentives of shareholders, creditors, rating agencies, regulators and even in some instances of the managers running them (Utset, 2011). The LCFIs are a product of integrations of financial institutions and thus, for a relevant treatment of systemic risk it becomes important to understand better this process as well.

- **Types of Systemic Crises**

Systemic crises are severe economic disturbances which are highly contagious, costly and typically involve a great number of financial agents. They are characterized by high levels of financial stress, reflected in: mass panics, herd behavior, shortages in liquidity, collapses of individual markets and shocks to the real economy. They can be national[128], international and global in their extent. Thus far 6 global financial crises occurred: one prior to the establishment of the gold standard, the Long Depression of 1873, two during the first globalization era, the Baring crisis of 1890-1 and the 1907-8 Bankers' panic, two in the world-war and the interwar period, the WWI crisis of 1913-4 and the Great Depression of 1929-33, and finally, in the second globalization era, the Global Financial Crisis (GFC) of 2007-8 (Bordo & Lane, 2010). In certain cases systemic crises threatened the whole of the GFS, like in 1932, at the peak of the Great Depression.

Systemic crises events are generally split into three groups: the (financial) banking crisis, currency crises[129] and (sovereign) debt crises. In a systemic banking crisis corporate and financial sectors within one NFS or a group of NFSs experience a large number of defaults, and consequently financial institutions face great difficulties in repaying their borrowings (Laeven & Valencia, 2008). As a result, the number of non-performing loans increases sharply and more affordable capital is urgently needed for the remaining institutions to survive. Triggers can be

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[128] however, under financial integration only crises emerging in small, peripheral and shallow NFSs tend to stay within the national boundaries. In a more general terms, a systemic crisis in a open economy will often have repercussions on at least one other NFS

[129] involve as well capital account crises

found in: depressed asset prices, sharp increases in interest rates, sudden slowdowns or reversals of capital flows, actual runs on the banks, or in realizations that systemically important financial institutions are in distress.

Historically, banking crises are split into two major groups, the pre- and post-1933 ones (Bordo & Lane, 2010). The creation of Federal Deposit Insurance Corporation (FDIC) in the 1933, to guaranty the safety of deposits in member banks, and establishment of the lender of last resort [130] as integral parts of the U.S. NFS, changed considerably the ideas about the principal risks involved in international banking crisis events. Liquidity risks were, at least in the advanced economies, considered no longer as threatening to banks and banking systems as solvency risks. The run on the Northern Rock banks, the first bank run in the U.K. in 150 years challenges this division. Northern Rock was only one of the institutions that failed in the eve of GFC because they relied on the continuous stream of short-term liquidity, obtained through securitization and wholesales markets, to meet the expiring short term debts. Once the short term liquidity did not materialize it was as if a bank run occurred from the institution's point of view (Shin, 2009). Shin argues that this brings back a strong rationale for additional liquidity requirements and constraints on raw leverage in the banking systems.

Laeven and Valencia estimate that 124 systemic banking crises occurred only in the period between 1970 and 2007 (Laeven & Valencia, 2008). Many of these crises caused, predicted or correlated with other forms of crises, evolving rapidly into twin or triple crisis events. The latter are essentially a number of times more aggravating and more difficult to resolve.

A currency crisis is commonly identified as nominal depreciation of a currency of at least 30%, which should be a 10% or larger increase in the rate of depreciation compared to the year before. Using this definition Laeven and Valencia identify a total of 208 currency crises [131]. Principal triggers for currency crises involve the depreciation of exchange rates, losses of foreign reserves and hikes on interest rates. Currency crises are detrimental for the NFS in which they originate, but can become internationally systemic under one of the following scenarios: if combined with other types of crisis events, if the currency in question is one of the reserve currencies of the IMS[132], if the currency is a common currency for a large number of separate economies or if there is extensive unilateral financial integration, and if the crisis stimulates speculators' attacks on currencies of other countries with similar macroeconomic fundamentals.

The last, in particular, is the characteristic of integrated financial systems and the mixed IMS. Under the high transparency requirements, speculators find easy targets in the economies that are similar to the ones currently in turmoil. In their efforts to disprove speculations, these economies are, paradoxically, becoming ever more likely to import the crisis and suffer unnecessary damages. The IMF calls these triggers the 'wake up' calls for the investors to reassess risk for a whole set of assets, entire regions or groups of countries (IMF, 2011a). They have proven to be particularly destabilizing in the Asian crisis, the crisis in Baltic countries that followed the GFC, and in the ongoing ESDC.

A debt crisis is an event in a financial system when there is a sovereign default or when a secondary

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[130] in FED

[131] includes large devaluations under fixed exchange regimes
[132] e.g. U.S. dollar, euro, pound sterling, Swiss franc, Japanese yen, Russian rouble and Chinese renminbi

market bond spreads reach values higher than an estimated critical threshold (Pescatori & Sy, 2004). Pescatori and Sy's threshold accounts for the psychological barrier above which market participants do not wish to hold the bonds. The authors estimate the threshold value at 1000 basis points[133] above the spreads for the U.S. Treasury bonds[134]. The definition extends standard notion that sovereign defaults are the most relevant events for foreign debt contracts. In fact, the authors argue that in the course of the past three decades only a small fraction of debt crises lead to actual sovereign defaults and that any serious treatment of debt crises needs to take into account other potential triggers and outcomes.

Triggers therefore include not only outright payment defaults and debt restructurings, but as well: turbulent conditions on the international capital markets[135], sudden inflation episodes, a country's application for and reception of a substantial IMF assistance, credit rating downgrades, occurrences of other types of crises. As for the outcomes, authors note primarily the lack of a universal definition of what actually is a default event. They stress the definitions offered by the leading CRAs, S&P and Moody's, which involve missed or delayed disbursement of interest and/or principal, along with distressed exchanges, through which entire contracts are renegotiated.

The definition by Detragiache and Spilimbergo is added to expend the default concept to the cases when there are outstanding arrears[136] of more than 5% of total commercial debt. A crisis episode ends when 1) the arrears fall below 5% threshold, 2) the

bond spreads stabilize below their respective threshold value, or 3) when full debt restructuring takes place. Crises occurring in the same economies in less than 4 years apart are generally considered to be the same crisis event. Sovereign debt crises can become systemic if 1) they stimulate the reassessment of the ability of other related sovereigns to finance their debt (e.g. the ESDC), 2) they develop into other forms of systemic crises, 3) if the default is endangering financial institutions in foreign economies (e.g. the LTCM)

A debt crisis event can evolve into full outright defaults (e.g. Russia in 1998, Argentina 2001), semi-coercive restructurings in case when the likelihood of a default is strong (e.g. Uruguay, 2003) or rollover-liquidity crises, when a solvent but illiquid country is on the edge of a default because investors are no longer willing to rollover short-term debt that is close to maturity (e.g. Mexico, 1994-5, Korea, 1997). Some of the defaults and rescheduling involve even outright repudiation, i.e. a government's official denial of liability (e.g. Cuba, 1963). Voluntary refinancing, i.e. the cases when a country with access to capital markets takes advantage of favorable terms of borrowing to prepay existing and more onerous debt, are typically not counted in the debt crisis events. Laeven and Valencia identify a total of 63 episodes of sovereign debt crisis from 1970 until 2007.

Finally, it is important to note the increased frequency of twin and triple crisis events since the beginning of the second globalization era (Laeven & Valencia, 2008). The tendency for one type of crisis to cause or transform into other types of systemic instabilities is particularly important for considerations of systemic instabilities on the GFS. It emphasizes additionally the importance of a common treatment for financial contagions and monetary transmission channels.

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[133] in the course of ESDC, however, the threshold has effectively been reduced to 7%
[134] which are traditionally deemed risk free
[135] e.g. large reversals of capital flows
[136] the part of a debt that is overdue after missing one or more required payments

- Systemic Crises of the Second Globalization Era

Systemic crises have been numerous throughout the past four decades, but only a small fraction has had a wider international impact. Majority remained confined within the original NFSs or had affected several adjacent NFSs at most. In the analysis by the IMF's Strategy, Policy and Review Department (SPRD) on systemic crises, the equally weighted indicator in particular is outlined as relevant for determining whether a crisis event is systemic within the GFS (IMF, 2011a). The construction of an equal weighted systemic crisis indicator is based on a simple average of normalized country-level real GDP growth, on one side, and the averages of the values of financial stress indices [137] or the exchange market pressure indices[138], on the other. The two averages are further used to calculate global economic[139] and financial[140] stress indices, respectfully. A simple average of these two normalized global indices is then taken as the equally-weighted indicator. The indicator accounts for both high interconnectedness of certain NFSs, and the possibility that a small country is a source of systemic instability.

Using the indicator, six events corresponding to four systemic crisis episodes on the GFS were identified between 1970 and 2009. These are: the 1982 Latin American Debt[141] crisis, the cluster of crises in the early 1990s[142] which culminated with the 1992 European Exchange Rate Mechanism (ERM) crisis, the late 1990 cluster in which the

1997-8 Asian crisis was closely followed by the Russian/LTCM crisis, and, finally, the GFC.

The Debt crisis was triggered by the appreciation of U.S. dollar and increase in the U.S. interest rates following the oil crisis in the 1979. The immediate consequence was the buildup of balance sheet instabilities in Mexico, which lead to its sovereign default in 1982. Following the Mexican default the flows of capital into Latin America dropped sharply, stopping the rollover of prior debts for a number of regional economies. Consequently, the crisis became region-wide (Felix, 1990).

The European Exchange Rate Mechanism (ERM) crisis came as a direct consequence of the Danish NO on the referendum for the acceptance of the Maastricht Treaty in 1992. Adding to the chain of crises that occurred worldwide a year earlier, this served as an alarm to investors about the feasibility of the common currency project in Europe. After reunified Germany pursued high interest rates to counteract inflation, a number of the ERM members were under strong speculative pressure to leave the ERM. Speculative attacks occurred on a number of currencies that were deemed the most vulnerable, particularly the pound sterling. The exit of the U.K. from the ERM on 16 September 1992, the Black Wednesday as it is popularly known, was the crisis's culmination, with the actual costs estimated at £3.3 billion only within the U.K. (Buiter, Corsetti, & Pesenti, 1998)

As noted in the previous section, the Asian crisis started in Thailand in July 1997. The Thai government dropped the national currency's peg to the U.S. dollar, due to the burst of a real-estate bubble which effectively bankrupted the economy. The crisis alarmed investors to reassess the risks region-wide and swiftly the whole of South-East Asia, along with South Korea were engulfed

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[137] for developed economies
[138] for developing economies
[139] a PPP-weighted average of country-level quarterly real GDP growth
[140] a weighted average of country-level FSI and EMPI
[141] also known as, simply, the Debt crisis
[142] Nikkei crash, DBL bankruptcy, Scandinavian banking crisis

(Corsetti, Pesenti, & Roubini, 1999). The consequent collapse of commodity prices impacted the developing economies with capital account convertibility all around globe. As a result, a sovereign default occurred in Russia, which further on triggered the LTCM collapse in the U.S.

Finally, the GFC emerged from the interplay between extensive deregulation, growth of a housing bubble, great expansion of the shadow banking system, implementation of new, complex financial instruments and the inaccurate pricing of their respective risks. The eventual burst of the U.S. housing bubble in 2007 caused the value of the securities tied to the U.S. housing prices to plummet. The contagion froze the markets for securities and swaps, and many major financial institutions faced high liquidity and solvency risks. By no longer being able to obtain funds in exchange for mortgage-backed securities, investment banks, hedge funds, mutual funds and other intermediaries within the SBS were no longer able to provide liquidity to their main clients – mortgage firms and corporations. The lending mechanism in the U.S. was profoundly disturbed.

A year into the crisis, the market for credit default swaps (CDSs) shrunk by 70%, (Kritzer, 2009) pushing a number of financial institutions towards bankruptcy[143]. The final drop was the bankruptcy of Lehman Brothers investment bank on 14 September 2008. The Lehman Brothers' was an alleged counterparty in close to $5 trillion worth of contracts in the market for CDSs (Pagano, 2009). The default was allowed so that the rescue efforts could be focused on one of the largest insurance companies in the world, the American International Group (AIG). The financial authorities in the U.S. underestimated the underlying international

exposure of the Lehman Brothers and the contagion went global almost instantaneously (Felton & Reinhart, 2009).

In their review, IMF's SPRD identify a number of common elements which characterized the emergence of these crisis events. In the countries of origin, these elements typically include: debt sustainability issues, problems in management of exchange rate policies, and strong financial vulnerability due to bursts of asset bubbles or maturity mismatches on the balance sheets. Commonly, a combination of at least two of the listed effects is under go in large systemic events. External triggers that appear the most frequent are the sudden changes in monetary policies in large advanced economies and the volatility in commodity prices.

An important aspect of the systemic crisis events is that a large number of economies with relatively strong fundamentals and low risk of exposure, gradually or abruptly, become involved into the crises. They become exposed typically because they borrow in a foreign currency[144] or because they are not immune to high external liquidity crunches and output losses. These economies are commonly referred to as the crisis bystanders. Bystanders can import crisis also by continuing to pursue monetary arrangements similar to those in the crisis-affected economies, with notable examples being Uruguay in the 2001 Argentinean crisis and Bulgaria, Estonia and Lithuania in the 2008 Latvian crisis. Experience has shown, however, that some crisis bystanders can actually benefit from the crisis events in the adjacent economies. This is because they became regarded as 'safe havens' and more desirable investment destinations[145].

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[143] Merril Lynch, Fannie Mae, Freddie Mac, Washington Mutual, Wachovia, Citigroup

[144] the characteristic also known as the 'original sin' (Eichengreen, Hausmann, & Panizza, 2003)
[145] e.g. the North European economies in the ESDC

Financial liberalization and integration of capital markets played important roles in the shock transmissions, particularly in the Asian crisis and the GFC. The notable exception is the Debt crisis, where systemic effect was achieved primarily due to the transmission channels relating national BOPs. This is because the cross border interconnectedness was still fairly limited in 1982 and financial markets were more segmented. Incomplete and asymmetric information contributed to the emergence of herding behavior in all four instants. The transmission of shocks proved to be highly non-linear, with reverberations occurring in economies fairly distant from the original turmoil.

As for the polices which have been used to mitigate the crises, one common thread is that, at least up until the GFC, they were domestically driven and focused primarily on restoration of confidence in the national markets. Uncorrelated and reactive responses contributed largely to the spread of instabilities, particularly in the ERM and Asian crisis. In the absence of the universally agreed ILOLR, emergency liquidity was provided primarily by the IMF, or through bilateral and multilateral arrangements with other national economies. Restructurings were also pursued in cooperation with private sector, like in the Debt crisis and in the LTCM default.

In South East Asia and in a number of oil exporting economies officials pursued accumulation of substantial foreign reserves to discourage speculative attacks on their currencies. They also pursued regional cooperation though reserve swaps and creation of common bond markets. The accumulation of reserves soared particularly after the Asian crisis but the actual usage of the reserves decreased. In the review, the authors note that reserve holding actually has a signaling value, because declining reserves often imply vulnerability

to speculation under the uncertainty on duration and the extent of international crisis events.

Differences in domestic policy responses reflected strongly global liquidity conditions (IMF, 2011a). They generally involved fiscal tightening and austerity measures, sometimes enforced externally by the creditors or the IMF. Countries also practiced extensive domestic liquidity provision, and in the GFC, numerous bailouts of large private financial institutions. The GFC showed that there exist no apparatus for safe dissolution of financial institutions with assets exceeding $100 billion (Haldane A. , 2010)[146]. Instead, majority of these institutions were regarded as systemic for the NFSs and were bailout at the taxpayers' expense, creating strong incentives for moral hazard. The authorities did however demand explicit commitments from the private sector to maintain their national and international exposures in support of the credibility of the sovereigns throughout the turmoil.

Following the Asian crisis and towards the GFC, international collaboration became more pronounced in crisis mitigation. In the wake of the GFC, the U.S. monetary officials pursued opening of a number of international swap lines with other central banks to prevent disruption in dollar funding markets. Swap lines were essentially reciprocal currency arrangements which enhanced the ability of these institutions to provide dollar funding to financial institutions in their jurisdictions (Fleming & Klagge, 2010). The swaps were pursued from 2007 to 2010, and, interestingly, they included arrangements with a number of economies outside of the common G-7 partnerships, e.g. Brazil, Mexico, Korea and Singapore. The swap lines were renewed in the ESDC, with the six major central

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[146] Haldane gives the example of Washington Mutual, the largest savings and loan association in the U.S. , which prior to its collapse in 2008 held assets valued at more than $300 billion and which was unsuccessfully resolved by the FDIC

banks providing similar arrangements and pursuing coordinated, accommodative monetary policies. Coordinated policing in treating the effects of the GFC were also agreed upon at the 2009 G20 summit in London, with the common pursuit of Basel III and other financial reforms (Brookings Global Economy and Development , 2009).

The IMF strongly opts for the development of the Global Financial Safety Net (GFSN), which would aim to provide rapid liquidity financing during systemic events, particularly to the crisis bystanders (IMF, 2011a). The SPRD report points out that the fear of how approaching the IMF for assistance is perceived by the investors makes many economies reluctant to ask for help until they are deeply in the crisis. The GFSN could improve the current liquidity provision solutions: the swap lines, the foreign reserves accumulation and private sector liquidity commitments, by essentially coordinating them into a common global mechanism. Regional mechanisms are challenged by the fact that, even if initiated independently and at different times, the capital inflows often end together within a fairly narrow time frame, due to crowding out effects (IMF, 2011d). A global insurance measure would thus benefit more the developing economies where the crowding out effect is stronger.

The ultimate addition to the GFSN would be the introduction of the ILOLR. The ILOLR would have to be able to issue a reserve currency. Allowing for the current issuers of reserve currencies to be the ILOLR would however necessarily imply a conflict of interest, since these have to act in favor of their individual national economies. Entrusting this role to the IMF on the other hand would imply that U.S. would give up its exorbitant privilege to issue the leading international currency. The IMF performed considerably better in the GFC than during the Asian or the Latin crises, potentially because the

endangered economies were the principal decision makers in the institution. The demand for IMF's assistance among the developing economies was however lower than ever during the GFC, as many developing economies have already accumulated substantial foreign reserves or have established bilateral / multilateral / regional funds. The developing economies, particularly those that are members of the G-20, in fact demanded a rebalance of member quotas and voting power within the IMF which would reflect the actual state of affairs in international finance (Lagarde, 2012).

Finally, the apparent dichotomy of the GFS into the developed and developing NFSs has a strong influence on the crisis propagation (IMF, 2011d). With developed countries dominating the crossborder linkages, the developing economies retain more concentrated international exposures. Moreover, foreign ownership is more prominent in NFSs of developing economies [147]. Interconnectedness is thus primarily a liability for the emerging economies. Disparity in the level of financial development and the depth of financial markets also persists. In general, even a small shift in portfolio allocation from the developed economies can overwhelm the absorptive capacity of the developing markets. In this aspect there is a common dispute between the push and the pull views on directing financial flows. The push view emphasizes the role the U.S. interest rates play in directing capital flows to developing economies. The pull view emphasizes the value of country's macroeconomic fundamentals in attracting foreign flows of capital. Push factors are critical for certain types of flows, like portfolio bond flows, while in international banking push are almost as important as pull factors. Future reforms of the IFA have a difficult task of addressing this dichotomy.

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[147] regions like CEEC and Latin America lead the trend with approximately 30-40% of all assets being foreign owned.
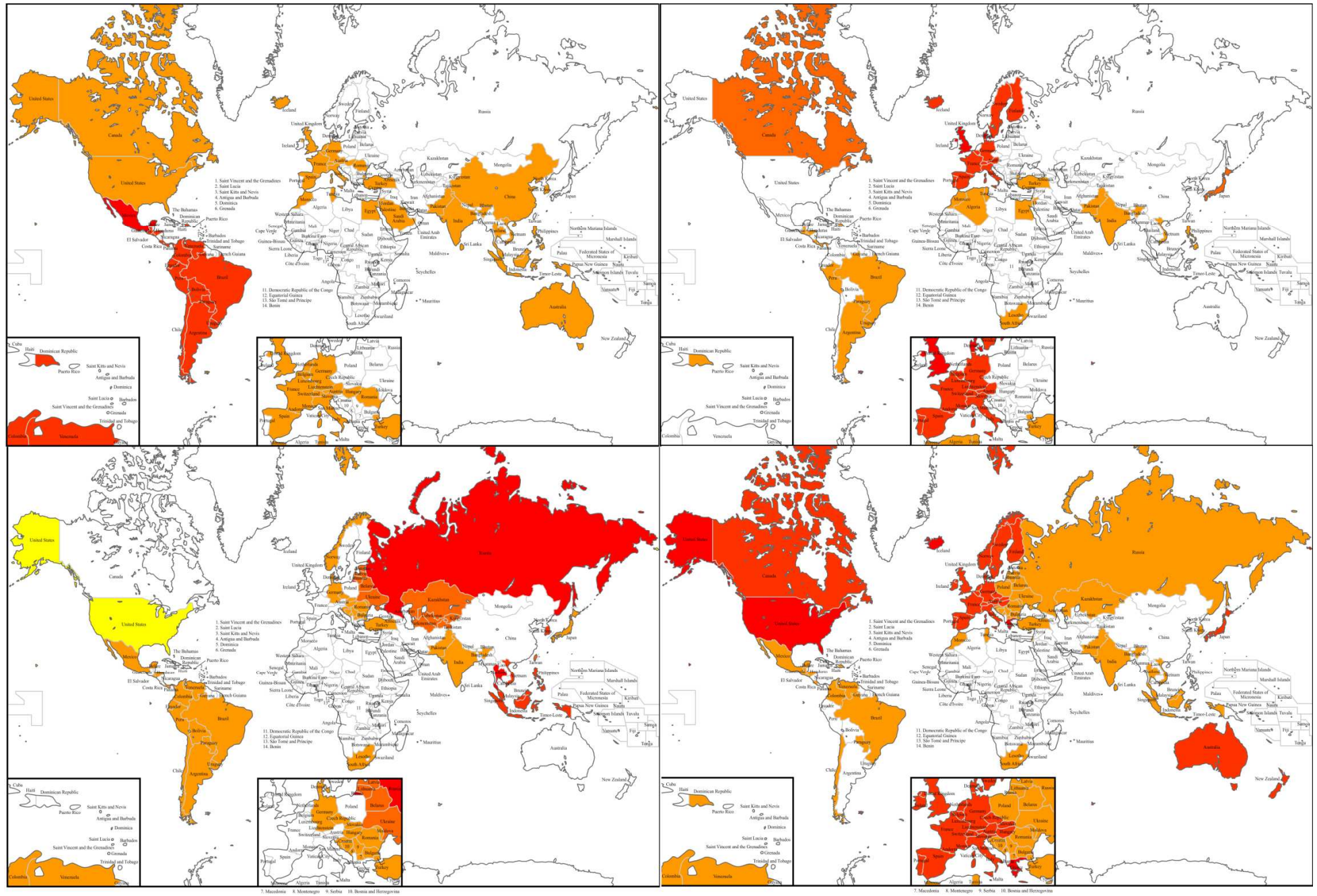
Figure 7: The spreads of four systemic crises: (from top-left to bottom right) the Latin American 1982 Debt Crisis, the 1992-3 ERM crisis, the 1997-8 Asian/Russian/LTCM crisis and the 2007-8 GFC (IMF, 2011a). Red is for the nations in which the crisis originated.

- European Sovereign Debt Crisis

Greece joined the EMU in 2001, taking the last chance to be a founding nation of the project. Greek integration was deemed premature by numerous analysts, but was also a strong political signal to the other EU economies to follow the lead (BBC, 2001). After the integration the 2004 change of government brought about the acknowledgement that the national officials did not disclose accurate data for their EMU entrance requirements. Insufficient political pressure from the peer EMU economies left Athens without sanctions, and Greek affairs persisted unaltered for another term (BBC, 2004; Little, 2012).

In 2009 when the government changed again, the corrections of the national deficit figures from predicted 3.7% to actual 12.7% of the GDP triggered a global alarm on the value of Greek debt (Nelson, Belkin, & Mix, 2010). Soon after, media exposed a complex affair in which one of the largest investment banks in the world, the Goldman Sachs, helped Greece both with bridging the required accession criteria up to the year 2001, as well as with engaging in a decade-long effort to camouflage the breaches of European debt limits set in the Maastricht Treaty (Story, Thomas, & Schwartz, 2010; Balzli, 2010). Greece was thus able to meet the Maastricht criteria without needing to impose higher taxes or reduce the public spending. With the GFC however, the inflow of foreign capital decreased considerably and exposed the economy and its financial system to the risk of not being able to finance its debt.

The problem reached a whole new dimension through recognition that similar arrangements might have occurred in a number of other EMU entrants as well (Story, Thomas, & Schwartz, 2010). The Greek sovereign debt crisis thus meant suspicion over debt sustainability in other peripheral European economies with similar portfolio and macroeconomic characteristics. Contagious developments first destabilized economies such as Ireland, Portugal (Hume, 2010; BBC, 2011), and consequently Cyprus, Italy and Spain (Cotterill, 2011; Financial Times, 2011). Finally, it even brought into question the ability of the zone's second largest economy, France, to fulfill its debt obligations, after it lost its AAA credit rating (Wiesmann, Spiegel, & Wigglesworth, 2012). The destabilization added onto the preceding GFC, and became profoundly political. Nine governments all around the EU collapsed or were headed for early elections[148] between late 2009 and early 2012. This chain of crises put into question the workings of European Central Bank (ECB) as an effective institution, euro as a safe currency and the overall further integration into Eurozone as a sound political movement[149] (Konrad & Zschäpitz, 2011; Micossi, 2011; Mueller, 2010). The result is one of the tensest political and economic scenarios seen in Europe ever since the 1990s economic crisis in ex Yugoslavia[150] (Milanovic, 1991; Marinković, 2003; Financial Times, 2011b).

ESDC points out a number of issues which arise directly from the interplay between the global financial integration and the process of regional monetary integration in Europe. The issues involve the need for regulation and supervision to understanding better the crossborder financial integration of institutions, as well as the need for a greater accountability and transparency in national economies. The affair uncovered strong incentive of

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[148] Bajnai's government in Hungary, Berlusconi's in Italy, Boc's in Romania, Cowen's in the Ireland, Fico's in Slovakia, Papandreu's in Greece, Rasmussen's in Denmark, Socrates's in Portugal, Zapatero's in Spain

[149] at the moment of writing, there is an ongoing discussion about the future of the EMU. All options remain open but there is a strong commitment for the EMU to emerge even more tightly integrated under German and French guidance

[150] which ended in a civil war and the federation's disintegration

national economies to deceive supranational regulation. The incentive comes from the positive effects monetary integration has on the costs of borrowing. This was discussed extensively earlier, with the conclusion that in the absence of strict specification of fiscal relations between the governments, the crowding out effect is dependent primarily on the aggregate fiscal policy of all the union's members (Claeys, Moreno, & Suriñach, 2011). Monetary integration without fiscal integration leaves therefore considerable space for arbitrage in the management of the BOP and of the national debt.

On the other hand, sovereign debt of developed countries has been strongly favored in banking systems because of their zero weighted capital requirements, and because of their classification as both the highest quality liquid assets in liquidity regulations and the highest quality collateral in central bank monetary and liquidity operations. In their efforts to grow fast, European banking institutions found the investments in sovereign debt to be perfect maneuvers around the Basel capital requirements. The enlargement of the EU and the promotion of some of the new entrants into developed economies expanded considerably the market for sovereign debt. Additionally, it stimulated perverse incentives in both the national debt management and the business models of the lending institutions themselves. Government debt was often excessive and banking institutions had at times strong exposures to the sovereign financial instruments. In the course of the ESDC some banks even systematically built up their holdings of their own nation's debt, tying themselves to the faith of their country of origin in case a new turmoil occurs[151]. A number of regulators already advocated

the revision of the Basel III design to include a prudential approach to sovereign debt. The approach would make a distinction between the sovereign debt of the economies which issue their own currency and those that do not. The former would issue the 'fully sovereign bonds' while the latter would issue the 'subsidiary sovereign bonds', and would thus put the emphasis on the correlations and codependences between these bonds (Turner, 2011a). Furthermore, the increased reliance of European banking institutions on the interbank market[152] as a source of funding and the mare extent of financial integration in the Eurozone makes any sovereign default a potentially systemic event for all of the member economies' NFSs.

The fear of a systemic instability remains the principal motivator for the reform efforts in the EMU. It is not clear, however, to which extent is the determination to structurally preserve the EMU and its financial system feasible. Currently, structural preservation implies pursuit of highly austere reforms in the endangered economies and a potential for substantial political instability. On the regional level, the measures include the creation of the European Financial Stability Facility (EFSF), which is to evolve into the European Stability Mechanism, an official bailout mechanism. They also include the ECB's announcement of its willingness to buy the bonds of all the troubled countries in the Eurozone (Peel & Milne, 2011) in the absence of common Eurobonds. Additionally, the ECB has long opposed restructuring of the Greek debt[153], which in the end of July 2011 was downgraded to the lowest rating ever awarded to a

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[151] important examples are those of Italian and Spanish major banks, e.g. Intesa Sanpaolo, Unicredit, Banca Monte Dei Paschi Di Siena, Banco Bilbao Vizcaya Argentaria and Banco

Santander, whose exposures to the respectful national sovereign debt across all issuance periods topped €30 billion in December 2011 (Soong, 2011)

[152] markets for wholesale loans In particular

[153] the restructuring was finally agreed on 27 Oct 2011, with predicted haircuts reaching 50%

sovereign economy - CC/Caa1 [154] (S&P, 2011; Trichet, 2011b)[155]. In 2011 the EMU members have also chosen to work towards the establishment of a fiscal union (Trichet, 2011; Soros, 2011; IMF, 2011b; Spiegel, Peel, Barker, & Pignal, 2011). It is a question, however, whether the peripheral economies, which by now include also Cyprus, Estonia, Malta, Slovenia and Slovakia, can all afford to pursue this step. The measures, overall, are radically challenging the GFS, because they are only buying time without bringing the needed closure to the issues. The danger remains that problems will, with time, actually grow out of proportions and become unmanageable.

The third issue is the reallocation of political power within the Eurozone and the wider EU arising from the process of crisis resolution. Unless any of the peripheral economies call for a referendum on the bailout conditions, Germany could emerge from the crisis as the prime authority over both monetary and fiscal policies of the entire Eurozone, weakening even the French position (Spiegel, 2012 ; Little, 2012). Good borrowing conditions during the ESDC allow Germany to impose political pressure on all the peripheral economies to straighten their fiscal policies, impose austerity in spite the recession and thus repudiate the risk of failed investments. At risk are German financial exposures in the peripheral economies and thus the overall German economy. The process is however imposing a new hierarchy in the network of interlinkages between national economies. It can also affect the position of the Europe's most important financial center, the City of London, as a more compact Eurozone can push for EU-wide financial regulation that can limit the scope of the center's activities.

The final issue is how to contain possible global ripple effects in case a chain of sovereign debt defaults does occur in the Eurozone. It has been estimated that a larger disturbance in the Eurozone could adversely affect the surrounding non-euro economies in Europe, in the U.S., in Africa, as well as the proximate countries of the ex-Soviet bloc (IMF, 2011c; Ncube, Lufumpa, & Ndikumana, 2010). However, the exact extent to which a Eurozone meltdown would affect the global economy remains elusive. Many analysts argue that the fact that the crisis is ongoing for two years should have prepared all the parties for the possible outcomes and not generate the momentum that followed the sudden Lehman default in 2008. Others point out that many governments are exhausted in their efforts to alleviate the crisis and are now longer in position to provide new bailouts for the financial institutions and structures (Smith, 2011). In terms of the architecture of the GFS, sovereign defaults in the Eurozone crisis could trigger a global systemic crisis much unlike any before. The crisis would be financial for Europe, the U.S. and Japan (Marsch, 2011). The consequent collapse of the common currency would trigger instabilities in the numerous economies with unilateral monetary attachment to the Eurozone as well as the economies which have a substantial part of their foreign reserves denominated in the euro currency. Moreover, it would affect the exporting nations which really heavily on trade with the EU, such as numerous African, Latin American, Mediterranean and East European economies. Finally, a new systemic crisis in Europe will necessarily be political, possibly even endangering the longstanding political relations between the member economies.

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[154] by S&P's and Moody's respectively, rating also known as junk, a single notch above the certain default
[155] the restructuring was finally initiated on Oct 27th

Summary	Systemic Crises on the GFS			
Systemic risk	risk that a market or institutional failure triggers either a failure of a chain of markets and/or institutions, or a chain of significant losses to financial institutions, resulting in increased costs of capital and decreased availability			
as externality	classical rationale for government / supranational authority intervention	**distinguish from**	**systematic**	exposures to common macroeconomic factors; facilitates market equilibrium; not diversifiable, but can be hedged
motivation for def.	LTCM/Asian/Russian crises		**idiosyncratic**	specific to an institution/market; diversifiable
in international / global terms	illusive concept; new sources become more important (capital market integration, international banking, securitization, derivatives, stock market comovement); GFSM	**Bordo et al. distinguish also**		contagion from transmission process
				contagion crises from currency crises
Systemic crises	severe economic disturbances which are highly contagious, costly and typically involve a great number of financial agents			

types	**(financial) banking crises**	**currency (capital account) crises**	**(sovereign) debt crises**
definition	(large) number of defaults in corporate and financial sector, causing financial institutions to experience great difficulties in repaying their borrowings	nominal depreciation of a currency of at least 30%, which is at least a 10% increase compared to the previous year	sovereign default or a secondary market bond spreads reaches values of more than 10% above the spreads of U.S. Treasury bills
triggers	depressed asset prices, increases in interest rates, slowdowns or reversals of capital flows, bank runs, news about distress in systemic institutions	depreciation, loss of foreign reserves, hikes on interest rates	outright defaults, debt restructurings, volatility in capital markets, inflation, CRA downgrade, applying for IMF assistance
important trends	national insurance of deposits and LOLRs, international banking, securitization, wholesale markets, international regulatory coordination	internationally destabilizing if: combined with other crises; currency is a reserve currency; there is monetary integration; there exist countries with similar CA balances and macroeconomic fundamentals	twin and triple crisis events; politically destabilizing; multiple outcomes possible: outright defaults, semi-coercive restructurings, rollover-liquidity crises, outright repudiation

Systemic Crises of the Second Globalization Era							Global Crisis Events
crisis events	**common features**		**response policies**		**dichotomy**		
	domestic	external	domestic	international	developed	developing	1873 Long Depression
Latin American Debt ERM Asian/Russian/LTCM GFC ESDC	debt sustainability exchange rate policies BOP maturity mismatches	volatility in commodity prices monetary policies of key reserve currency issuers	dominate; depend on global liquidity conditions; signaling value of reserves	are emerging; facilitate access to liquidity (swap lines, restructurings, coordinated monetary policies); ILOLR and GFSN	dominate international flows of capital greater market depth push vs. pull effects	concentrated international exposures more vulnerable	1890-1 Baring Crisis 1907-8 Banker's Panic 1913-4 WWI Crisis 1929-33 Great Depression 2007-8 GFC

2.5 Complex Systems Studies Approaches

The previous sections of the Analysis, aimed to cover extensively the notions of global financial system, as an infrastructure, the global financial integration and large scale regional monetary integrations as, respectfully, systemic and systematic processes on this system. Finally, it covered the notion of a systemic crisis event, and suggested which types of these events can arise from the interplay between the two processes. The extent to which the notions were reviewed has a three-fold purpose.

The first is to gain appreciation for the complexity of the system. Not only in terms of the number of agents involved in the infrastructure, the intricacy of relations, or the opacity of claims, but as well in terms of diversity. The immense diversity between the individual agents, their incentives, financial instruments they employ to fulfill these incentives, related regulation and supervision, and the perpetual development of new solutions is what makes the global financial system a unique complex infrastructure. Financial integration, as a process that creates consolidation and convergence, and thus acts to reduce diversity, is still poorly understood, and should be studied to a greater extent. In particular, better understanding is needed of how changes in the agent interactions at the micro level alter the macroscopic features of the system, e.g. systemic risk.

The second reason is to explore the synergy between the two processes. As already argued, monetary and financial relations have never been more profoundly associated than under the current IMS, particularly regarding the issues of systems' stability. This, however, might be one of the very first inquiries in which monetary and financial integration are directly confronted. Financial integration appears emergent in the individual activity of the financial agents and gradually tipping the national and international incentives, while monetary integrations imply international consolidation of tens of different monetary policies, exchange rate mechanisms and reserve holdings, which directly or via externalities affect individual agents. It remains unclear how to quantify this interaction, particularly when one takes into account the underlying diversity. It is, nevertheless, unambiguous that the two processes are mutually stimulative. Financial integration creates environment in which monetary convergence is desirable, and monetary convergence creates incentives for further financial integration. Equally so, financial integration allows for financial crisis to be imported from abroad, while monetary convergence can also act to amplify the crisis shocks and distribute them further via transmission channels which relate BOPs of different economies. The latter is not as much a reference to the ESDC as it is to the IMF's concept of a 'wake up' call, which alerts investors to reassess their exposures in the economies with similar macroeconomic characteristics to the ones in turmoil (IMF, 2011a).

Finally, every step along the way, the Analysis emphasizes information inefficiencies that arise with the integrations. Transparency and easier exploration of investment and borrowing opportunities are the terms most commonly related to integrations. However, the amount of data required for a single agent to make sensible decisions under the integrated setting often borders with incomprehensible. With global incentives and national regulation the problem becomes that of scales, e.g. the optimal size of a financial institution, the optima exposures, the optimal range of regulatory activities. Moreover, there is an incentive to specialize in information analysis in order to facilitate other agents' decision making. The emerging signaling infrastructure affects profoundly the incentives of financial agents and therefore

inefficiencies in its functioning can be disruptive for the NFSs (Becker, 2011).

The three listed problems are deemed by this analysis as the critical research directions for the exploration of the interplay between integration processes. The rest of the inquiry explores sets of models which have set the path for the former two directions. The impact of integration processes on the asymmetry of information is explored at the greater extent in the Discussion section. The inquiry now turns to the models developed in or enhanced through the Complex Systems Studies Approaches (CSSA). Following the GFC, the CSSA, and in particular the network theory, is seen as invaluable tool to tackle the problems of modern international finance (Allen & Babus, 2007; Haldane A. , 2009; Sheng, 2010; Gaffeo & Tamborini, 2011; IMF, 2011d). To understand better the modeling requirements for financial agents with diverse incentives, different internal structure, obliging to various sets of regulation but competing effectively in the same environment, one can find a good base in network representations of banking systems. The models have advanced considerably over the past decade and now allow for effective examination of fairly intricate settings. The CSSA have brought in the modeling options to explore these settings in virtual environments with a great number of agents, but also to give new interpretations to the empirical results obtained from the real data. The setting is a good starting point to envision, for example, how to go about the interaction between the banking and non-banking institutions in integrating financial markets. Similarly, the models of aggregate financial interactions between the various nations appear to be the appropriate starting points for understanding how international relations, particularly monetary convergence and consolidation, can contribute to the spread of systemic financial crisis events.

- The Banking Systems Models

The stability of financial systems and the occurrence of systemic failures have been researched in terms of understanding and modeling interbank relationships ever since the late 1980s. Banking systems are a natural target for the initial studies since they make one of the oldest and the most important financial subsystems (Tumpel-Gugerell, 2005). In addition, banking crises are among better understood forms of financial crises, considering that they have been occurring for centuries now (Grossman, 2010). Among the earliest studies of interbank relations, three are of particular interest. Bhattacharya and Gale point out that interbank market can act as a mean for co-insurance against uncertain liquidity shocks, and thus might be considered as a shock absorption mechanism in official policies (Bhattacharya & Gale, 1987). Flannery further on implies that interbank exposure should stimulate market discipline through peer-monitoring (Flannery, 1996).

Allen and Gale, on the other hand, identify the overlaps in the financial claims between different banking sectors as one of the main channels for the spread of banking crises[156] (Allen & Gale, 2000). Their argument essentially is that if a crisis strikes one financial institution, other financial institutions with claims in the affected institution might suffer losses as well. This is because those claims will lose in value. In a simple four-bank model they show that, in spite of the fact that the first-best allocation of risk sharing could always be achieved, the arrangements are prone to contagious events even from small liquidity shocks. The increase in completeness of interbank claims structure acts as a

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[156] for the simplicity they opt not to include other channels like the asymmetry of information and the effects of international currency market

stabilizer, with every bank taking over a small fraction of the disturbance.

Consequently, Eisenberg and Noe analyze the clearing mechanisms and their role in the occurrence of systemic instabilities (Eisenberg & Noe, 2001). Their primary goal is to account for the cyclical interdependence. This is a property that the value of an issuing firm is dependent not only on the value of payoffs it receives from the claims on other firms, but as well on the claims that those other firms have on yet other firms, and so forth. It is therefore likely that the claims will come back to the issuing firm itself. The authors give an algorithm for both the efficient system clearing and the estimation of the systemic risk faced by individual firms. Their results show that even unsystematic shocks can decrease the total value of the system. Finally, they point out that using differentials in total asset values to measure the effects of the economic shocks on a group of connected companies can at times be highly misleading.

Cifuentes et al. identify another important contagion channel to be the change in asset prices (Cifuentes, Ferucci, & Shin, 2005). Both non-depository and depository financial institutions tend to hold a considerable amount of marketable assets and hence cannot be accounted for in the analysis that assumes fixed prices. By allowing for price effects, Cifuentes et al. assume a downward sloping residual demand curve for illiquid assets. A shock that reduces the market value of an asset induces an incentive to eliminate the asset from the portfolio. If market cannot absorb the asset liquidation, there is a short run decrease in the overall market prices. Once asset prices change, externally imposed solvency constrains or internally imposed risk controls can drag the prices further down. Mark-to-market accounting combined with the solvency

constraints can thus induce endogenous responses far stronger than the initial shock. Therefore, liquidity requirements, very much like capital requirements, can moderate the effects of contagion.

Leitner extends the Allan and Gale model by introducing the possibility of private sector bailouts (Leitner, 2005). His results show that the fluctuations in the distribution of endowments [157] can cause network collapse even if there is no significant fluctuation in the aggregate endowment. Further on, interlinkages can motivate banks to bail one another provided that they can coordinate under the growing risk of systemic contagion. A central planner is introduced with an option to make voluntary transfers of endowments at the instant at which they are realized. It can thus influence the incentives of agents towards system optimization. Leitner obtains the estimates for the optimal number of groups and the optimal number of agents within the groups for joint liability arrangements. He shows that optimal group size can be finite even in infinitely large economies with independent and identically distributed endowments. In the optimization problem however, Leitner ignores important issues such as moral hazard, coordination problems and free-riding. The explanatory power of his analysis is critically limited by the fact that real agents do not aim at forming optimal interaction networks at all times.

The early developments in the network science, such as the Watts-Strogatz's small-world and the Barabasi-Albert's [158] scale-free network models,

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[157] defined as random variables that are both larger and smaller than one with positive probabilities

[158] from here onwards referred to as WS and BA models. WS small-world networks are the networks in which the average path length between any pair of vertices grows logarithmically with the size of the network, coupled with a high clustering coefficient. BA scale-free networks are networks with a power-law degree distribution, i.e. $P(k) \sim k^{\gamma}$ where the exponent γ is between -2 and -3

inspired extensive studies of the underlying topologies of financial systems (Watts & Strogatz, 1998; Barabasi & Albert, 1999). Work of Boss et al. on the network structure of the Austrian interbank market is a good example of such a study (Boss, Elsinger, Summer, & Thurner, 2004). The degree distribution of the Austrian interbank network follows a power-law with the exponent that classifies it close to a scale-free distribution. In addition, they show that the average path length is short and the clustering coefficient is low. The authors simulate the effects of node removals on the wider network. Fitting with the scale-free distribution, network shows great resilience towards random node defaults, while it is fairly vulnerable to a default of some very connected nodes, hubs. Boss et al. claim the small world property for the network as well, but their findings, particularly the low clustering coefficient, are not consistent with the definition. Analogous results are replicated in studies of other national banking systems (Furfine, 2003; Upper & Worms, 2004; Wells, 2004; Degryse & Nguyen, 2007; Mistrulli, 2007; Soramaki, Bech, Arnold, Glass, & Beyeler, 2007)

Assuming that the structure of a banking system is exogenous and well approximated with an uniform Erdős–Rényi network [159] Nier et al. [160] show that the system can be characterized by a set of five parameters (Nier, Yang, Yorulmazer, & Alentorn, 2007). These parameters are: 1) the total value of external assets $\mathbf{E}$[161], 2) a fixed portion γ of total assets $\mathbf{A}$ which corresponds to the net worth $\mathbf{c}$ for each bank, 3) the percentage θ of the total assts $\mathbf{A}$ in the aggregate size of total exposures $\mathbf{I}$, where $\mathbf{I} = \mathbf{A}$

– $\mathbf{E}$, 4) the probability $\mathbf{p}$ for the existence of individual links between two different banks, and 5) the total number of banks $\mathbf{N}$.

For every realization of the network, balance sheets are filled so that the banking system would obey the balance between assets and liabilities. The asset side of the sheet, $\mathbf{a}$, is composed of the external assets $\mathbf{e}$, which are the investors' borrowing, and the interbank loans $\mathbf{i}$, i.e. the other banks' borrowings. The liabilities side of the sheet $\mathbf{l}$ is composed of the net worth of a bank $\mathbf{c}$, i.e. the capital buffer, the customer deposits $\mathbf{d}$ and the interbank borrowing $\mathbf{b}$. The standard balance sheet identity holds and hence $\mathbf{a} = \mathbf{l}$. The contagion mechanism is modeled by inducing a shock in one bank at the time, for any given realization of the system. A shock is equivalent to removing a certain fraction $\mathbf{s}$ of the bank's external assets. Seniority is assumed in the way this loss is absorbed, giving the least preservation priority to the net worth $\mathbf{c}$ and the highest to the consumer deposit $\mathbf{d}$. A bank is to default if $\mathbf{s} > \mathbf{c}$. The loss is absorbed by the creditor banks if $\mathbf{s} < \mathbf{b} + \mathbf{c}$. Otherwise, the deposits are affected. A contagion is to propagate down a chain of banks until the shock is fully absorbed.
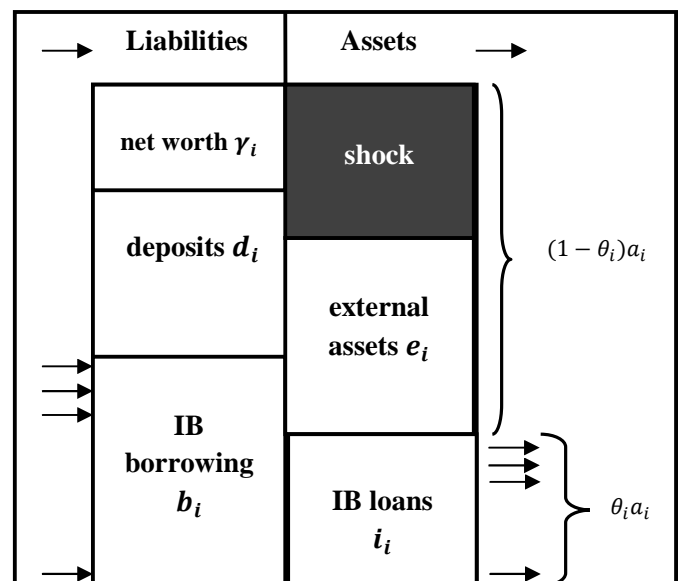

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[159] edges are generated between each pair of nodes with equal probability, independently of other edges; the ER model from here onwards

[160] NYYA model, from here onwards

[161] the total value of loans made to the ultimate investors which thus relate to the total flow of funds from savers to borrowers through the banking system

By varying the values of the five parameters, NYYA obtain a number of interesting results. Firstly, they show that banking capitalization is strictly negatively related to the occurrence of a contagion, but this relationship is non-linear. Secondly, they point out that an increase in the amount of interbank assets helps in diversification, but also implies an increased chance to forward shocks to interbank creditors. Thirdly, interbank connectivity also has two opposing effects on contagion spread. Newly added linkages can act as shock-transmitters when prior connectivity is fairly low, and as shock-absorbers at the opposite extreme. Accordingly undercapitalized banking systems are even more fragile when connectivity is high, whereas well-capitalized banking systems are resilient to contagion, even more so when well connected. Finally, as for the effect of the change in concentration on contagion, the conclusion is that a more concentrated banking system is more vulnerable to systemic disturbances.

To generalize these results NYYA also check for the effects structural parameters have under the assumption of 1) liquidity effects, following Cifuentes et al. and 2) tiering[162]. With illiquidity, number of contagious defaults increases for all levels of connectivity, all levels of net worth and all levels of systems' concentration. As for tiering, NYYA consider the space between the two extreme cases: 1) a homogeneous network where connections from both first (hubs) and second tier (periphery) are equally probable, and 2) a star formation, where one first tier bank is connected with every other bank. In general, initial increases in connectivity with the hubs stimulate the spread of contagion, while later they have a more stabilizing effect.

The work of Gai and Kapadia[163] builds up on the NYYA and the Watts's simple model of global cascades in which the 'robust-yet-fragile' property [164] was first thoroughly discussed on complex networks (Watts, 2002; Gai & Kapadia, 2010). They study, analytically, the spread of contagion due to both direct effect of interlinkages in interbank claims and the indirect effect of the liquidity effects on the asset side of the balance sheet. GK model takes into account the nature and the scale of aggregate and idiosyncratic shocks and allows for interaction between asset prices and balance sheets. The resulting mechanism is that of a highly non-linear system dynamics where the extent of contagion is sensitive to initial conditions.

For the analytical discussion GK use the generating functions technique. The technique allows for transformation of a problem about sequences into a problem about functions, and, subsequently, for the usage of function manipulation to describe the sequences (Grinstead & Snell, 2003) [165] . The financial network in GK is a directional network with **N** financial intermediaries. In-degree of each node reflects the interbank exposure, while the out-degree is indicative of bank's liabilities. The joint distribution of in and out degrees governs the potential for contagion spreads through the network. The interbank assets **I** and the illiquid external assets **M**, e.g. mortgages make up the total assets **A**.

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[163] the GK model, from here onwards
[164] the fact that seemingly indistinguishable shocks can have very different consequences on the overall system functioning
[165] the ordinary generating functions for an infinite sequence (q_1, q_2, q_3, q_4, …) are nothing more than formal power series: $G(x) = g_0 + g_1 x + g_2 x^2 + g_3 x^3 + \cdots$; GK use the specific case of probability generating functions for a discrete variable X of the distribution p_r which is given by the following formula:

$$G(y) = E(y^x) = \sum_{r=0}^{\infty} y^r P[X = r] = \sum_{r=0}^{\infty} p_r y^r$$
$$\text{where } G(1) = \sum_{r=0}^{\infty} p_r = 1$$

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[162] allowing for the existence of hubs and for variation in sizes of institutions

Total liabilities **L** are composed of interbank liabilities and the exogenous consumer deposits **D**. The capital buffer **K** is equal to the difference between assets and liabilities. Initially all banks are solvent. Once a default occurs, a neighboring bank **i** loses all interbank assets against the defaulted bank. Bank solvency condition is consequently:

$$\varphi = \frac{K_i - (1-q)M_i}{l_i} \qquad (3)$$

Here φ is the fraction of banks with obligations to the bank **i** that have defaulted and **q** is the rescaled price of illiquid asset[166]. After the default, every bank **i** that was connected with the defaulted bank loses $\frac{1}{j_i}$ of their interbank assets, where j_i is the in-degree for bank **i**. The condition for the spread of default is then:

$$\frac{K_i - (1-q)M_i}{l_i} < \frac{1}{j_i} \qquad (4)$$

A bank for which this condition holds is considered vulnerable, while other banks are deemed safe. If the probability of being vulnerable is denoted by v_j, $\forall j \geq 1$, and the p_{jk} is the joint degree distribution of in and out degree, then the probability that a bank is vulnerable is $v_j p_{jk}$. The probability generating function for a joint degree distribution of a vulnerable bank is given as follows:

$$G(x,y) = \sum_{j,k} v_j p_{jk} x^j y^k \qquad (5)$$

The generating function **G** gives all the moments of the degree distribution of vulnerable banks. Since every interbank liability is another bank's interbank asset, the average in-degree and out-degree are equal and denoted **z**. By fixing **x = y = 1**, the fraction of the banks in the network that are vulnerable is given by:

$$G_0(1) = \sum_{j,k} v_j p_{jk} \qquad (6)$$

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[166] significantly less than one in the case of 'fire sales'

The average size of vulnerable clusters S is then:

$$S = G_0(1) + \frac{G_0(1)G_1(1)}{1 - G_1'(1)} \qquad (7)$$

A phase transition occurs when the average out-degree of a vulnerable first neighbor G_1' is equal to 1. The condition for the phase transition is therefore:

$$z = \sum_{j,k} j\, k\, v_j p_{jk} \qquad (8)$$

In case $G_1' < 1$ all vulnerable clusters are relatively small and contagion does not spread far from the initial default. For $G_1' > 1$ a giant vulnerable cluster exists in the network, implying that a random default can cause a global contagion. Increases of **z** lead to competing tendencies in v_j and p_{jk}. Namely, the joint degree distribution p_{jk} increases, while the probability of a bank **j** being vulnerable v_j decreases. Consequently, the phase transition has two or no solutions. If there are two solutions, there exists a continuous window of values of z for which a contagion is possible. The spread of contagion is dependent on the size of the giant vulnerable cluster, if existing. Once contagion percolates the giant vulnerable cluster it is no longer valid to assume that a randomly chosen bank is adjacent to no more than one defaulting bank. In fact, contagion is likely to spread to the entire connected component which contains the giant vulnerable cluster. For higher values of z, the connected component is considerably larger than the cluster. This is where GK find the intuition for the robust-yet-fragile property of the financial networks. Global contagions occur rarely but when they do they can take the entire system down. Abandoning the assumption of homogeneous distribution of interbank assets over incoming links only widens the contagion window.

Similar to NYYA, GK analyze the effects of variations in key structural parameters on the size of

contagion window. Their results confirm that erosion in capital buffers increases the probability and the speed of contagion. Relaxing the zero recovery assumption reduces the likelihood of contagion because fewer banks are vulnerable, but the distributions retain similar shape to the original ones. Incorporation of market liquidity risk introduces shocks on the assets side of banks' balance sheets and widens thus the contagion window. Liquidity risk materializes in GK only upon an actual default, which is a strong understatement. The most important result, however, arises when the simulations are compared to the currently available analyses of the actual financial systems of developed economies, where the value of the average node degree is often estimated at 15. For the GK model this means the upper phase transition and implies that financial systems are likely to exhibit a robust-yet-fragile property.

May and Arinaminpathy [167] continue the experimentation with the NYYA and the GK model by introducing the 'mean-field approximations'. The initial settings for the MA model are essentially the same, along with the same solvency condition[168], and the same first and second phase shock condition (May & Arinaminpathy, 2009). New in the MA is the assumption of identical parameterization of all banks. MA use the mean-field approximation of a given random ER network to a uniform one, with the node degree $z = p\,(N-1)$. Initial phase shock is caused by wiping out fraction f of the external assets of a random bank, i.e. $s(I) = f(1-\theta)$. A bank fails if $f(1-\theta) - y > 0$ and the loss $s(I) - y$ is evenly distributed among defaulting bank's creditors. For a loss larger than the total borrowing each bank loses its total loan. The second phase shock condition is then given by $s(II) =$

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[167] MA model, from here onwards
[168] $y_i = (e_i + l_i) - (d_i + b_i) \geq 0$

$\dfrac{\min\,[\theta,\ s(I)]}{z}$ and the phase II failure can occur if $s\,(II) > y$.

MA add several important extensions to the NYYA and the GK results. Firstly, the model allows for a thorough discussion of the phase III and higher defaults. Assuming $z^2 \ll N$, MA derive conditions for **y** under which phase III failures cannot occur regardless the values of all the other parameters. Secondly, their results fit rather well with the numerical estimates performed in both the NYYA and the GK. Authors argue therefore that simple mathematical models like the mean-field approximation hold considerable explanatory power for analytically describing the dynamical behavior of randomly connected networks of banks.

Third, the MA model allows for an extensive analysis of the impact of liquidity shocks on the contagion. One particular aspect which MA explore is the occurrence of universal liquidity shocks, affecting nearly every financial institution in the system. Liquidity effects often affect the prices of the same type of assets throughout the system, particularly if a certain asset type is identified as the principal cause of the prior defaults. As a consequence, contagion windows widen considerably and phase II shocks can be experienced by any of the $N - 1$ initially solvent banks. The authors derive the conditions for **y** under which phase II and phase III defaults are not possible. Another aspect is that MA differentiate between liquidity effects caused by an explicit failure of a specific class of assets – a strong liquidity shock (SLS), and a more general 'loss of confidence' that can arise throughout the system and can cause depreciation of other asset classes initially held by the defaulted bank – a weak liquidity shock (WLS). Any WLS type asset can turn into an SLS type asset if it is held as well by subsequently defaulting banks. Adding WLS to the

analysis widens significantly the original contagion windows, where only SLS and interbank shocks are accounted for.

The authors also provide an extensive discussion of the principal problems that arise in the analyses which assume exogenous underlying networks. Evidence suggests that real interbank networks are far from random, and show long-tailed degree distributions, size variations as well as disassortative tendencies when establishing connections[169]. Moreover, a significant variation in size of the banks in real financial systems brings about important side-effects. The ratio of net worth to total assets owned by one bank tends to be such that large banks have relatively smaller capital reserves. Apart from initial considerations in NYYA all pre-GFC studies ignore the problem of scales and of preferential attachment. Some of the first extensive treatments are provided by Sui and Teteryatnikova (Sui, 2009; Teteryatnikova, 2010).

The critical deficiency, according to MA is the assumption that interbank borrowing and lending relations do not change following a default. A bank facing an actual phase II default as a result of a borrower's default will borrow more itself to cover the deficit. On the other hand, in large financial turbulences credit dries up. Here one can revisit the definition of systemic risk by Schwarcz, which covers the availability and the price of capital. Accordingly, the problems that financial systems experienced during the GFC arise from the liabilities side of the the balance sheet not on the asset side, implying therefore that NYYA, GK and MA do not capture the runs adequately.

Finally MA point out a number of directions for future studies. One is the clarification of the role liquidity effects have in contagion propagation.

Unlike other types of shocks, liquidity shocks do not experience attenuation but tend to grow, as even more banks hold the depreciating asset. Second is understnading the dependence of the system on the fraction θ that is held in the form of interbank loans, particularly under universal banking. This gives a potential ground for estimation of the effects of policies such as Glass-Steagall on the performance of the financial system. Another is the issue of whether all banks need to have the same ratio of net worth y to total assets A, and is there a stong argument for enforcing specific arrangements the so called 'too-big-too-fail' institutions. The final issue regards asset heterogeneity and the resulting equilibria.

Opposite from MA, Acharya finds the standard theoretical approach to design of bank regulation, which considers a 'representative' bank and its response to a particular policy mechanism, to be completely obsolete (Acharya, 2009). The approach ignores the fact that investment choices of each of the banks have externalities on the payoffs of other banks and their investment choices. Banks can thus be viewed as playing a strategic Nash game in responding to financial externalities and regulation. Acharya's analysis is twofold, having a positive and a normative aspect. The positive aspect of the analysis provides for a precise definition and an equilibrium characterization of systemic risk. Systemic risk is defined as a joint failure risk arising from the correlation of returns on asset side of bank balance sheets. Additionally, he characterizes the conditions under which banks prefer an inefficiently high correlation of asset returns in equilibrium. The normative aspect of the analysis gives a design of optimal regulation to moderate inefficient systemic risk

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[169] small banks tend to connect to a few very large ones

The author allows little, if any, forbearance[170] in joint bank failures and advises bank sales upon individual bank failures. Moreover, he proposes that the capital adequacy requirements should reflect increase in correlations of both idiosyncratic and systemic risks. The model assumes that banks have access to deposits in form of a simple debt contract and that they can consequently invest in risky and in safe assets. Systemic risk is endogenous and arises from the fact that in equilibrium banks prefer to lend to the same industries. Upon a bank failure losses for depositors are not internalized by the bankowners. This externality creates the need for a regulator[171]. Regulator's objective is to maximize the total welfare of bankowners and depositors accounting for the social costs of financial distress.

The externality of a bank default is essentially twofold. There is a negative externality of the reduction in aggregate supply of funds and, consequently, a recessionary spillover with the reduction in profits. On the other side, there is a positive externality since surviving banks have a strategic benefit from defaults of their competitors. In the case when the negative externality dominates, banks tend to choose asset portfolios that are highly correlated to the portfolios of other banks. There exist three standard scenarios under which this may occur: 1) defaulting banks are 'large', implying an ex post substantial reduction of aggregate investments, 2) defaulting banks are 'essential', implying that their depositors will not relocate their investments to surviving banks, 3) defaulting banks are 'unique', implying regulation which prohibits the acquisition of its businesses by other parties. Negative externalities act therefore to increase the overall systemic risk.

The regulator attempts to moderate systemic and individual risk shifting incentives of bankowners by designing a closure policy and capital requirements that will take into account the collective investment policies of the banks. The closure policy here is the bailout of the failed bank with a dilution[172] of bankowner's equity claim. Greater dilution implies a lower forbearance in the closing policy, i.e. shorter postponement of loan payments. A bailout eliminates financial externalities but induces moral hazard, depending upon the extent of forbearance exercised. The optimal closure policy is hence not the same ex ante and ex post, confronting 'too-many-to-fail' with 'too-big-to-fail' policies. Under 'too-many-to-fail' guarantee bankowners anticipate greater forbearance upon joint than upon an individual failure, and hence are more likely to make correlated investments in order to extract more subsidies. This increases substantially the systemic risk. Under 'too-big-to-fail' guarantee, individual banks are more likely to make reckless, correlated investments within their own portfolios, again increasing the systemic risk.

In order to reconcile the two competing effects the risk undertaken by banks should be analyzed in accordance with the portfolio theory. The risk can be decomposed into the general risk factors[173] and the idiosyncratic components. A correlation-based regulation would encourage idiosyncratic risks taking by charging a higher capital requirement against exposure to general risk factors for the same risk levels. Prior to the GFC, BIS regulation recommendations focused intensively on the intra-bank correlations, and ignored the inter-bank correlation effects. Optimal regulation takes into account both contributions. Additional attention should be placed on the effects of inter-bank

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[170] postponement of loan payments
[171] e.g. a central bank

[172] the reduction in earnings per share that can be claimed after all debts have been repaid
[173] interest rate, foreign exchange rate, industry, etc

competition on risk taking. Competition stimulates more aggressive business lines and increases correlations in of banks' portfolio returns. This results in a counterbalancing effect equivalent to the one in regulatory arbitrage.

Bringing the notions of externalities and complexity together Caballero and Simsek develop a relatively simple model[174] where banks assess the soundness of their trading partners by collecting information about them (Caballero & Simsek, 2011). CS use the notion of complexity externality to describe the conditions where there exists high uncertainty about cross-exposures of individual financial institutions in the system. Banks in the model have only local knowledge about the exposures, which is to say that they are well aware of their own exposures but are increasingly uncertain about the exposures of their counterparties and the counterparties of their counterparties, etc. During regular times, this amount of information is sufficient to insure a unique equilibrium similar to the case when there is complete information. This equilibrium will have no fire sales, it will have relatively short default cascades, and a significant amount of new assets will be purchased.

In the case an unexpected liquidity shock occurs, there are three possible equilibrium settings, depending primarily on the magnitude of the shock. For small shocks the unique fair-asset-price equilibrium from the previous case is preserved. For very strong initial shocks, there is a unique fire sale equilibrium, which assumes long cascades, flight-to-quality and no new asset purchases in the system. For intermediate values both equilibria are attainable depending on the available information and the intricacy of the underlying network of cross-exposures. The progress towards the fire sale equilibrium occurs as more banks become distressed, increasing in the likelihood of indirect shocks on other institutions. Banks are assumed to cautiously account for the worst case scenario. Under large initial shocks they will aim at eliminating the acquired assets and will restrain from purchasing new by effectively accumulating liquidity. The shock turns swiftly into a liquidity crisis and further on into a financial crisis event. CS contrast the effect of the actual cascades, which need not be extensive, with the large aggregate effects arising from increased payoff uncertainty. The latter appears to drive the crisis propagation. Banks demand counterparty insurance, but the sellers within the network chose not to pledge collateral in insurance contracts due to their own payment uncertainties.

The complexity externality as identified by CS creates many policy opportunities. It encourages actions of financial authorities and governments that are aimed at reducing the size of the cascades, including direct bailouts and asset purchases. Additionally it encourages measures which aim to reduce the complexity and improve transparency in the system. These include regular stress testing, compulsory insurance of bank deposits and widespread guarantees for banking assets. The CS model does not allow credible sharing of information among financial institutions because distressed banks tend to suffer losses from revealing that they are distressed. The banks which are more closely tied to the defaulting institution will have a clear incentive to misinform about their involvement, disturbing therefore the aggregation of information. Moreover, under uncertainty there exist an incentive to gamble 'for resurrection' by not selling the assets. Such gamble could be beneficial for the network stability if the gambling institutions are sufficiently remote from the turmoil, while it could equally empower the contagion, if they are adjacent to the defaulting institutions.

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[174] CS model, from here onwards

- The International Financial Flows Models

In this section three subsets of empirical models on the international flows of capital are reviewed. The first is a set of models of the international banking system, which directly contrasts the theoretical approach to inter-banking relations emphasized in the previous section. The second set elevates the focus of the analysis a notch higher up the GFS's hierarchy and explores the aggregate financial flows between various economies. The last set focuses on the correlations between the national financial indices under financial integration. The idea of the section is to collect valuable insights from empirical studies performed at various levels of GFS's functioning, and to contest them for evidences of the effects of integration processes.

Principal data sets explored in these models are the BIS international banking statistics and IMF's CPIS. The two data sets most commonly used from the BIS banking statistics are the locational and the consolidated statistics. The locational banking statistics contain quarterly data on international financial claims and liabilities of the banking institutions in reporting countries[175]. The data can be further on separated by currencies, by country of residence of the counterparty, by nationality of the reporting institutions and finally by sector, i.e. bank, non-bank and public financial institutions. The consolidated banking statistics contain quarterly data about the banks' on-balance financial claims on the rest of the world and are thus considered a good measure for the foreign exposure risk of national banking systems. The data aggregates contractual lending by the head office and all of its branches and subsidiaries on a worldwide consolidated basis. The claims can be broken down by maturity, sector and with respect to a particular

country. Recent additions to the data are the ultimate risk basis, which accounts for the risk mitigants applied in individual national banking systems, but as well data on exposures resulting from derivatives contracts, extended guarantees and credit commitments (BIS, 2012). The drawback in using BIS data is that only a fairly small number of countries consistently report on their banking statistics to the BIS, and a large number of currently contributing economies has started doing so only recently. These statistics therefore lack important information about the banking systems in developing economies and are significantly biased towards the developed ones[176].

Von Peter uses the locational statistics from the BIS reporting economies to build a network representation of international banking centers, with each node denoting a set of banks located in one of 212 countries or jurisdictions, and links between them representing aggregate claims between these centers (von Peter, 2007). Furthermore, by taking the advantage of the data's divisibility into banking and non-banking financial sectors, the author actually separates each country's node into these two sectors. He then applies the network theory metrics, such as nod degree distribution, closeness[177], betweenness[178], prestige[179] and other centrality measures, to identify the banking centers which play an important role for the international banking system.

The results of the analysis suggest that although the best connected and most central locations are generally also the largest centers, an important network position need not come with size. Some

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[175] both domestically and foreign own, including data on exposures with respect to their own affiliates in other countries

[176] currently only 43 countries provide the data for locational and only 30 for consolidated statistics (BIS , 2011)
[177] the length of the average shortest path from a particular node to any other node in the network
[178] the frequency with which a centre lies on the shortest path
[179] reflects the importance of the principal counterparties

locations appear not as well connected as their global market shares would suggest, e.g. the U.S. and Cayman Islands, while others appear connected beyond expectations, e.g. Canada, Macao and India. Relations with the non-banking institutions contribute significantly to the in-degree of a large number of centers. This is particularly true for the international hubs such as the major offshore centers, which appear to have liabilities to non-banks virtually everywhere around the world.

Centrality measures identified Switzerland's banking sector as the principal intermediary between pairs of non-bank nodes worldwide, while U.K.'s banking sector is the principal intermediary between pairs of banking sectors. Analysis identifies also a number of regional centers which play a significant role in intermediation across their respectful continents, such as Austria and Denmark in Europe, Canada and Panama in the Americas, Bahrain in Middle East, and Singapore, Hong Kong SAR and Australia in Asia-Pacific. The prestige metric is exceptionally high for the U.S., since other important centers deposit sizable shares of their portfolios with the U.S. banks.

Hattory and Suda extend this research by adding a temporal dimension to the previous setting (Hattori & Suda, 2007). By combining the data from the BIS locational statistics on exchange-rate-adjusted crossborder bank credit, between 1978 and 2009, for 184 countries and jurisdictions, the authors aim to estimate the crossborder flows as changes in crossborder exposures. In addition, they compute various statistical measures for the properties of network topology and compare the evolution of these metrics across time. They find evidence for increasing overall connectivity, shortening of average path length, increasing average node degree as well as clustering coefficient. Authors confirm that up until their research took place, the

tendencies in the listed metrics have not been irrevocably affected by the crisis events such as Asian or ERM crisis. Their results are thus indicative of the advances in financial integration and improved terms of capital allocation across the observed period. They also report increasing systemic risk in international financial markets.

The same data set was later studied by Minoiu and Reyes to include the period of 2007-9 during which the GFC took place (Minoiu & Reyes, 2011). They extend Hattory and Suda's conclusions with the observation that network metrics characterizing the international banking system tend to be volatile. In fact they identify a number of structural breaks which separate waves of capital flows in the historical data. Three global waves in crossborder capital lending preceded the three major crisis occurrences, the Latin American debt crisis, the Asian crisis and the GFC. The crisis events temporarily disrupted the connectivity of the network, with the largest shock occurring during the GFC. Here the net cross lending dropped to a negative of almost $1 trillion following an all time high of $4.3 trillion in 2007. Authors also note that country centrality falls at the onset of sovereign debt crisis.

Garratt et al. explore as well the BIS locational statistics and apply an information theoretic map equation[180] to partition the banking groups from 21 countries into modules (Garratt, Mahadeva, & Svirydzenka, 2011). They consider the data between 1985 and 2009, and separate each country into two nodes, one being the funding and other the credit arm of the national banking system. The authors thus differentiate between two contagion channels in their model, the credit channel where banks can default on their loans and the funding channel where creditors refuse to continue lending. The

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[180] (Rosvall & Bergstorm, 2008)

modulation technique intends to detect stress concentrations in the international banking system, and relies heavily on the financial claims data to build a well specified transition probability matrix. The idea is that the modules which experience financial stresses the most are those modules which are characterized by large and mismatched balance sheets. Countries within the same module are expected interact more strongly with one another. Authors assume that in a stable network, the key modules will act as absorbers. Systemic risk increases with the propensity of the key nodes to transmit contagion. Using the historical data, they follow the evolution of international banking network from the late 1980s setting in which four major financial centers, the U.S., the U.K., Japan and the Cayman Islands formed one large super cluster, to the late 2000s setting where a larger number of hubs shared similar total influence as the few large modules had previously. The former setting was highly contagious in terms of stress transmission within its ranks, but less on a global scale. The latter setting allowed for broader and more efficient contagion spread.

Hale takes the analysis a step further by constructing a global banking network with nodes which are internationally active banks themselves, not their national aggregates (Hale, 2011). By doing so she addresses the issue of origination times of the claims and the heterogeneity in loans issuances which are neglected in the BIS data. She uses syndicated bank loans[181] with median maturity of 5 years [182] as a proxy for bank linkages in the international bank network. According to her data[183], syndicated loans make on average about

15% or all annual loan issuances. The data comprises years between and including 1980 and 2009, a total of 7938 institutions[184], 141 countries, and over 15000 registered loan issuances. Hale builds a network representation for each of the years and for a cumulative time lapse, calculates network statistics[185]for the representations, and follows their evolution. Moreover, the author takes into account the recession years in the U.S. and the years of systemic banking crises in the data analysis.

The underlying motive of Hale's research is that information asymmetries can be reduced in financial systems via interbank lending relationships, because these relationships facilitate the information flows. The author aims to examine the extent at which these relationships are affected by recessions and banking crises. Initially, the she examines the structural aspects of the system. She notes that establishing new relations stimulates loan origination and reception for a given bank. At the country level, the total lending and borrowing extends with the increase in the number of key banking institutions[186] present in the system. At the global level, she notes that international banking network experienced two major expansion periods, one in the early 1990s and the other in the early 2000s, while the most significant contraction period coincides with the GFC.

Expansion involved increases in the number of institutions and countries in the system, but its dominant trait is the increase in connectivity. Consequently, Hale devises a simple two country theoretical model in which she examines the effect of demand, supply or cost-of-capital type shocks on the endogenously established relationships. The

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[181] loan provided by a group of lenders and consequently structured, arranged and administered by one or several commercial or investment banks
[182] much longer than the maturity of interbank loans, and hence more stable relations
[183] Dealogic's Loan Analytics Database

[184] lenders, borrowers or both
[185] density, diameter, out and in degree distributions, betweenness
[186] banks which acts as the single intermediary between at least one pair of banks, i.e. whose betweenness is positive

results obtained from the model are largely consistent with the data. Namely, local recessions and banking crises in smaller economies generally tend to decrease the internal connectivity and stimulate connectivity with foreign entities. Similarly, recessions in large economies lead to advances in exploration of foreign opportunities, i.e. the push effect, with borrowing connections declining at home. Ultimately, a global banking crisis has a strongly disruptive effect on the network, with very little if any new connections formed.

The dataset provides a number of other interesting observations. First, the entry of the new banks slowed down in the decade prior to the GFC, partially due to the integration of financial institutions in the U.S. and the EU. The share of new connections also declined during this period. On the other hand, number of participating countries was consistently increasing and it reached 141 in the final year of observations. During the expansion periods not only did the volume of lending increase rapidly but intermediation involved a greater number of financial institutions and counterparties. Network density was also increasing, as a result of the trends in the overall connectivity and the number of institutions. The later contributed to the raise in the share of key banks in the system.

Interestingly, the number of newly added banks which became key intermediates has been decreasing ever since 1990. This contributes to the composition effect, where new banks enter the system with fewer connections than the established banks have on average. The GFC however shifted the core of the network away from developed and towards developing economies by disturbing the ability of large banks to form relationships abroad. Hale concludes that the structure of the international

banking network responds to economic and financial shocks, and that it could actually be amplifying the effects of the global credit cycle. Latter is particularly reflected in the recognition that deterioration of interbank relationships is adding additional weight to the real costs of financial turmoil. The responsiveness of the structure is also an important argument against static or exogenous models of international banking systems.

The work of Barrat et al. on the weighted networks analysis stimulated another direction in the study of systemic events in international finance (Barrat, Barthelemy, Pastor-Satorras, & Vespignani, 2004). Unlike the previous set of models which focuses exclusively on the performance of the banking systems, the focus here is on the aggregate financial dynamics between the national economies. This is to say that one considers the international financial network (IFN [187]) where all financial agents originating in the same country are aggregated into a single node. What matters consequently are the linkages[188] between countries and financial centers. Initially the approach was used to describe the international trading network (ITN), as a legacy of the trade theory and the gravity model (Fagiolo, Schiavo, & Reyes, 2007).

Fagiolo, Reyes and Schiavo are among the first to extend this analysis from the international trade onto international finances as they obtain a number of interesting results (Fagiolo, Reyes, & Schiavo, 2007). They use the data from the IMF Coordinated Portfolio Investment Survey (CPIS). The set contains relevant statistics on 71 economies, starting from year 2001 and is structured in five subsets: total assets, equities and debt, which is further on separated into long- and short-term debt. The authors start by working out a comparison

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[187] distinction from the GFS is intentional
[188] financial flows

between the trade and financial systems. Analysis in the section 2.2 already pointed out the relevance of the organization of the international trade network for improvement of the IFA. The network theory based comparison is an interesting addition to the discussion.

Fagiolo et al. follow the lead of Kim and Shin and study concurrently developing globalization and regionalization phenomena on the systems (Kim & Shin, 2002). Further on, they rely on the results by Kali and Reyes to claim the hierarchical structure of the global trade system and emphasize the core-periphery distribution. Kali and Reyes concluded that globalization and regionalization coexist because of the gradual integration of smaller, developing economies into the system. The overall connectivity induces the effects of globalization onto all of the integrated economies, but trade patterns remain strongly determined by geographical proximity, as emphasized in the gravity models. Finally, country's position in the network is seen to have substantial implications for economic indicators of the economy. Fagiolo et al. aim to check if these results are valid for the GFS. Moreover, they claim that their method can indirectly estimate international financial integration[189].

The unidirectional network approach is deemed sufficient for the analysis, considering that majority of linkages in both the ITN and the IFN are reciprocal. Considerable relevance of some small offshore economies in the IFN created difficulties in choosing a data set which will suit both systems[190]. Statistics used are from 2001 until 2004 only. The analysis indicates that the network representing the ITN is nearly complete, while the connectivity in the IFN is considerably lower but increasing. For

the IFN in particular, there exists considerable difference between connectivity levels for each of the asset classes. The network for short-term debt is rather sparse with density of up to 35% of a fully connected network. More pervasive is the network for equities, while the long-debt contracts are substantially the most widespread.

Using the node degree distribution authors categorize the economies into three distinct groups: the 'elite' that is connected to nearly all the other economies, a larger group of countries with an average node degree, and a 'periphery' of less connected economies. Progress is evident however, as some peripheral economies gradually move to the middle group. A weighted network analysis unveils however that the vast majority of connections carries very little weight, which is further on confirmed by the value of Herfindahl index[191]. Disparity in the ITN is low and stable over time, while in the IFN it is gradually decreasing from a high initial value. The node strength [192] correlates positively with the countries' per capita GDP, implying that wealthier economies are better connected. This correlation is notably stronger for the IFN and persists across all asset classes.

Additionally, weighted analysis rejects the hypothesis that there is a hierarchy in the both systems, as the weighted clustering coefficient is positively correlated with node strength. This phenomenon is widely known as the 'rich club phenomenon', and means essentially that

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[189] as there is no direct reference to price in the model
[190] trade data is taken from the U.S. Comtrade database

[191] Herfindahl-Hirschman Index (HHI) measures the concentration in lending relationships in a financial network (IMF, 2011d). If N is the number of creditors and s_i is the share of creditor i in country's foreign liabilities, then HHI is defined as $h_j = \sum_{i=1}^{N} s_i{}^2$, normalized to [0,1] range :

$$\frac{H - \frac{1}{N}}{1 - \frac{1}{N}}$$

[192] node degree equivalent for weighted networks

interconnected triples of the network are more frequently composed of links with higher weights. The correlation is stronger in the ITN case, which is expected taking into account higher connectivity of the ITN. In IFN there exists as well a strong positive correlation between the average weight of edges connected to a given node and the node degree (strength). This implies that, on average, countries with many trading partners also tend to maintain more intensive relationships. Moreover, in the IFS, a very small fraction of countries commands substantial share of all trade in financial assets. Both connectedness and rich-club phenomenon can be seen as a sign of the persistent relevance of regionalization. The growing importance of global links, on the other side is evident in the disassortative feature of both systems, i.e. poorly connected nodes connect to more connected ones and use them as hubs to access the rest of the network. The ITN remains more disassortative than the IFN.

Together with Fagiolo et al., Chianzzi takes the next step in this analysis by following the lead of Minoiu and Reyes (Chinazzi, Fagiolo, Reyes, & Schiavo, 2012). Namely, the authors now focus solely on the IFN, but expend the observation period to include all the available CPIS data[193], and in particular, the period during the GFC. They cover the same five asset types, and build a 5-layer weighted-directed multigraph, with each link being weighted by the value of security issuances between the origin node and the recipient. Alike Minoiu and Reyes and Hale, they aim to examine the effects of the GFC on the topological properties of the IFN, but they also want to investigate, through an econometric study, the ability of network-based measures to explain cross-country differences in crisis intensity. \

Firstly, in their descriptive analysis, they note that the GFC altered the IFN's topology by decreasing the overall connectivity, and by altering the distribution of connections. They find the evidence for different recovery times among asset types, with equity securities being the quickest to adjust and debt relationships taking considerably longer time to respond. The analysis identifies the tendency to enter credit/debt relationships with countries that have lower probability of being financial partners among themselves. Creditors with many debtors acted strongly to reduce the number of counterparties. Recovery in international financial relations is evident in the final year of observations. Chinazzi et al. confirm the correlation results from the previous inquiry by Fagiolo et a. They, however, find that the global disassortative, core-periphery structure was not altered significantly during the GFC.

Expending the network centrality analysis they differentiate the 'authorities', the nodes that are pointed to by many well connected nodes, from the 'hubs' which point to many authorities[194]. As such, financial authorities are the primary sources of investment while hubs are the primary borrowers or financial centers. Financial centers can be important authorities if they intermediate strong flows between different fellow economies, e.g. Luxembourg, while they can also show a lack of authority if they are regionally oriented, e.g. the Cayman Islands in their relationship with the U.S. The results also confirm that the role of the U.S. as the major international investor is diminishing, while the U.K. is rising in the rankings[195].

In the cross-sectional econometric analysis they show that the network measures do improve the

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[193] up until 2010

[194] authorities contain useful information (funds) , while hubs are nodes that point to where this information is located
[195] China is not included in the data

explanatory power of the empirical model. Moreover, they find evidence for non-linear effects, as the high degree of heterogeneity in the IFN breaks down the monotone relationship between connectedness and diversification benefits. This is the confirmation essentially of the robust-yet-fragile property as pointed out by GK in the previous section. The authors thus argue for the usefulness of network indicators in predicting country vulnerability to shocks, and consequently for important policy implications.

In the last subset of models, the relations are no longer related to the actual flows of capital, but rather to the correlations between financial indices which characterize the overall national economy. In the section 2.4 it was indicated that correlations in stock markets indices have a potential to increase systemic risk (Beine, Cosma, & Vermeulen, 2010). Sandoval uses the data from world stock exchanges, prior and during the periods of systemic financial crises, to build correlation networks of indices for different threshold values and diverse time spans (Sandoval L. J., 2011; Sandoval L. , 2012; Sandoval & Franca, 2012). The aim is to analyze how clusters form in these correlation networks and how they evolve in time, particularly during turmoil. The analyses jointly cover some of the major stock exchange crises from the previous two decades[196]. As the data continues to amount during this period, the number of studied indices increases from the initial 16 in the first semester of 1986 to 92 in the second semester in 2010.

Sandoval represents the relations as a minimum spanning tree, a graph which contains all indices connected by at least one edge so that the sum of edges is minimal and there exist no loops. 'Asset

trees' are, consequently, built by establishing a threshold value distance measure above which specific indices are not considered. The procedure of determining the distance measure values involves determination of daily log-returns for each index[197], which are then used to calculate a correlation matrix C based on Spearman's rank correlation[198] among indices. The distance is then defined as

$$d_{ij} = 1 - c_{ij} \qquad (9)$$

Spearman's rank is deemed useful because it captures well the non-linear relations between indices. The correlations vary between -1 (anticorrelated) and 1 (fully correlated), and therefore the distance varies between 0 and 2. Typical values used however are 0.2 to 0.6. It must be noted here that networks built from correlation matrices are not directed networks, and cannot hence be used to deduct causality effects on their own. The author builds three-dimensional maps using the principal component analysis to minimize the difference between the true distance and the graph representation of distance. The threshold value is established by performing sets of 1000 simulations with randomized data, by determining at which level noise turns disruptive for the connections between indices. A compromise is made between the amount of analyzed data and the choice of small time intervals which can capture the relations between the indices. The chosen interval length is one semester.

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[196] the 1987 Black Monday, the 1997 Asian crisis, the 1998 Russian crisis, the dot-com bubble burst in 2001, the post 9-11 shock and the GFC

[197] $R_t = \log P_t - \log P_{t-1}$, where P_t is the value of the index on day t and P_{t-1} on day $t-1$

[198] a non-parametric measure of statistical dependence between two ranked variables; for a sample size of n, the n raw scores X_i, Y_i are converted to ranks x_i, y_i and the correlation coefficient is computed with the following formula:

$$\frac{\sum_i (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_i (x_i - \bar{x})^2 \sum_i (y_i - \bar{y})^2}}$$

The results are rather interesting. Initially the fact that stands out is the presence of two clusters throughout all periods – the American and the European cluster. At the core of the American cluster are the highly correlated S&P 500 and Nasdaq indices, while the European core becomes more complex over time, starting with Germany-Netherlands duo, but growing steadily over years to include France, Italy, Spain, Sweden, Switzerland and the U.K., at very low thresholds. It is possible to notice the detachment of the U.K. from the American cluster with the progress of financial integration in the EU. For higher values the American cluster is joined by Canada and Latin American economies, while European cluster grows to include the rest of Scandinavia and of the Western Europe.

Distance from the Eastern European countries, which themselves form a cluster, decreases with the progression towards 2000s. European cluster is also joined by Israel and South Africa. The Asia Pacific cluster starts to solidify after 1997, following the regional crisis. At its core are Hong Kong SAR, Japan, Singapore and South Korea. Australia and New Zealand gradually detach from European cluster and join the Asia Pacific. Prior to the GFC, the integration of European, American and Asia Pacific clusters occurs already at intermediate threshold values. Indices from the Caribbean, Africa and Arab economies connect only at much higher threshold values where noise is dominant. The author notes however, that the most interesting results tend to emerge around this threshold value. Central Europe exhibits a high degree of centrality when analyzed for standard centrality measures. During the crisis periods networks shrink in size and augment in the number of nodes, reflecting the growth in correlation between market indices. Overall, the results replicate well generally assumed trends in financial integration. They also confirm

the decrease in relevance of physical distance on market indices correlations.

Finally, Sandoval uses the eigenvalues of the correlation matrix of the asset time series to obtain further information about the correlations. In particular, he notes that the while the highest eigenvalue corresponds to the general oscillations common to all indices, the second largest eigenvalue is connected to some internal properties of the markets, e.g. the fact that they operate in different time zones. He identifies two large blocks of countries that move together as a second approximation to the market comovement, the western and the eastern ones. By lagging the second group of indices by one day, new structure obtained for the second eigenvalue separates the European cluster from all the others.

Sandoval's analysis gives a very interesting perspective on financial integration. It is a contribution to the efforts initially proposed by Keskin et al., Kwapień et al., Onnela et al. and Eryiḡit et al. on correlations in foreign exchange markets and in stock markets (Onnela, Chakraborti, Kaski, & Kertesz, 2002; Eryigit & Erygit, 2009; Kwapien, Gworek, Drozdz, & Gorski, 2009; Keskin, Deviren, & Kocalkaplan, 2011). The approach is a useful addition to the preceding line of models on financial systems, as it can account for the effects that contribute to the spread of systemic instabilities, but do so beyond the primary financial interactions, e.g. monetary transmission channels. In particular, by applying the method to the 10 year national bond yields and comparing it with the correlation network for exchange rates, one could maybe obtain interesting information about the extent of financial and monetary convergence between various countries, adding invaluable information to the contagion analyses which focused on international banking system.

Summary	Complex Systems Studies Approaches		
theoretical models of banking systems		**empirical models of international banking systems**	
authors	**key notions**	**authors**	**key notions**
(Bhattacharya & Gale, 1987)	interbank market as a shock absorbing mechanism	(von Peter, 2007)	network representation and analysis of international banking centers
(Flannery, 1996)	interbank exposure stimulates market discipline	(Hattori & Suda, 2007)	evolution of international banking relations
(Allen & Gale, 2000)	overlaps in interbank exposures as a contagion channel; positive effect of network completeness	(Minoiu & Reyes, 2011)	the effects of the GFC on the network properties of the international banking system
(Eisenberg & Noe, 2001)	clearing mechanisms and the effects of cyclical interdependence	(Garratt, Mahadeva, & Svirydzenka, 2011)	information theoretic approach; modulation of a set of national banking groups
(Cifuentes, Ferucci, & Shin, 2005)	change in asset prices as a contagion channel; case for liquidity requirements	(Hale, 2011)	global banking network; nodes not nationally aggregated; effects of crises and recessions on interbank lending and borrowing
(Boss, Elsinger, Summer, & Thurner, 2004)	interbank network topology analysis of a particular national banking system	**correlation models** **(indirect estimates of financial and monetary integration)**	
(Nier, Yang, Yorulmazer, & Alentorn, 2007)	exogenous, uniform ER structure assumed; effect of change in values of structural parameters	**authors**	**key notions**
(Gai & Kapadia, 2010)	robust-yet-fragile property	(Sandoval L. J., 2011) (Sandoval L. , 2012)	correlations in stock market indices; extent of financial integration; behavior in turmoil
(May & Arinaminpathy, 2009)	mean-field approximation	(Sandoval & Franca, 2012)	extension of the results on correlations in crisis periods
(Acharya, 2009)	externalities of individual bank's investment choices; game theoretic approach	(Keskin, Deviren, & Kocalkaplan, 2011)	correlations among major international currencies
(Caballero & Simsek, 2011)	complexity externality; effects of limited information availability counterparties' exposures	(Kwapien, Gworek, Drozdz, & Gorski, 2009)	network structure of the foreign exchange market
(Battiston, Delli Gatti, Gallegati, Greenwald, & Stiglitz, 2009)	procyclicality of higher connectivity, particularly when in turmoil	(Eryigit & Erygit, 2009)	cross-correlations of global market indices
international financial flows		**other interesting models**	
authors	**key notions**	**asymmetry of information:** (Nieuwerbugh & Veldkamp, 2009) (Mondria & Wu, 2011) **game theoretic approaches to integration processes:** (Dmitrishin, 2008)	
(Fagiolo, Reyes, & Schiavo, 2007)	network representation of international financial flows; comparison with the trade network		
(Chinazzi, Fagiolo, Reyes, & Schiavo, 2012)	network analysis of international financial flows; focus on the effects of the GFC		
(Oatley, Danzman, Pennock, & Winecorff, 2011)	network approach to international political economy; both BIS and CIPS data used		

3. Discussion

The Analysis first examined thoroughly the properties of the global financial system as an infrastructural system. Consequently it provided an in depth coverage of the various aspects of financial integration. It continued by presenting an extensive overview of the theory behind the monetary integration processes, and of the interplay between monetary policing and financial integration. Furthermore, it addressed the issue of systemic risk on the GFS and it surveyed the past crisis occurrences for the key traits of modern systemic instabilities. Finally, based on the observations from the previous sections, it argued for three directions in particular which ought to be examined in order to reach a more profound understanding of integration processes on the GFS. For two of these directions a short literature survey of CSSA models is given in support to the further modeling efforts. In this section, some of the key points of the analysis are revisited to provide a wider discussion and to challenge the initial ideas.

To begin with, all of the discussed notions: the global financial system, financial integration, monetary convergence, systemic risk and systemic crises do not have single commonly accepted definitions. They often change with authors, and sometimes even the authors themselves evolve in their ideas about the terms. For the working definitions in this inquiry the author aimed to consolidate the definitions provided by the prime research authorities and the more general understanding acquired in the preparation for the inquiry. The structural approach influences additionally the definitions. This can be noted in the definition of financial integration, where not only integration of financial markets is taken into account, but also the process of integration[199] of financial institutions. Though a common part of all

[199] through cooperation, mergers and/or acquisitions

integration processes, the latter has been consistently neglected in the financial integration related analyses. In addition, the inquiry aims to avoid the bias towards definitions grounded primarily in western practice. It is a common trait of the academic papers on the issue of integration to call a system global but focus exclusively on financial institutions in the North Atlantic economies. The fact is that, even though these economies dominate the global financial affairs, have the best data, and are at the core of the recent financial integration efforts, the financial development is happening elsewhere as well and truly 'global' inquiries should to take this into account. In that manner, the issue of monetary integration is intentionally explored beyond the EMU setting, to obtain insights from other, less ambitious practices.

The notion of systemic risk is particularly ambiguous when treated on an international scale. The term is often abused in the literature because it is confounded with systematic risk, or, more importantly, because the authors do not give clear boundaries to the 'system' which is explored. In general, authors take the 'financial system' to be, unjustifiably, synonymous with a banking system and implying thus that systemic risk is synonymous with the risk of the occurrence of contagious banking defaults. The fact that banks are often more than just banks, and that institutions other than banks sometimes happen to perform banking functions, make this generalization a rather dangerous word play. The danger is that narrow and simplified definitions neglect the 'shadow' region, where the problematic outliers seem to be residing. This generates an inaccurate and outdated image of the modern issues in international finance, the one which dominated the literature prior to the GFC. A particularly important case where the difficulty to distinguish between systemic and systematic risk seems to be abused is in dealing with the LCFIs. In

the GFC aftermath, it remains a challenge to decouple the default risk of some of these institutions which is due to the failure of their individual business lines, from the systemic risk.

Similarly, systemic crisis events are simplistically reduced to the events which involve chains of consequent banking defaults, while in practice systemic instabilities often propagate beyond the banking systems to involve other financial institutions and the wider economy. In fact, the monetary and financial transmission channels appear mutually stimulative in shock propagation, and non-financial crises, e.g. currency and debt crises, can grow to produce financial turmoil and vice versa. The co-activation of these shock transmission channels is particularly emphasized in the Asian crisis, the GFC and the ESDC.

Furthermore, as the section on heterogeneity pointed out, even the general treatment of financial institutions, e.g. banks, is overly simplistic for international finance. Banking institutions defer profoundly across the borders, but, under the integrated markets, they effectively compete against each other. Moreover, they compete against many different types of non-banking financial institutions. It is important to address these competition effects, not only because they stimulate risk seeking behavior but also because they tend to alter irrevocably the underlying structure of financial relations. The financial liberalization period, between 1994 and 2007, created an environment in which growing larger and more diversified in business lines is the only reasonable strategy. In the process, a great number of banking institutions in the U.S. and the EU failed, acquired or were acquired by other competitors. It is important to note that keeping the regulatory focus on the banking systems, neglects the mergers and acquisitions which were initiated earlier among the

non-banking financial institutions, and which consequently added the momentum to banking integration through the universal banking practices. Such is the example of the building societies in the U.K., whose number was steadily decreasing ever since the late 1930s, from nearly 1100 to roughly 50, with key mergers and acquisitions occurring in the 1980s (Rivett, 2012). In the late 1990s some of these institutions, like the Northern Rock, became banks themselves.

The message to take home is that in order to effectively study modern banking systems one should acquire a solid understanding of the practices and developments outside this system, among the non-banking competitors. This is particularly relevant as the key innovative financial practices of the last three decades all have emerged outside the banking sector, and have gradually found their way into the regulation. The first set of models which exemplify the CSSAs to banking systems, points out a strong bias towards a uniform representation of financial agents. The latter simplifies greatly the calculations, but does not address the fact that more than a quarter of the value of the modern GFS lies outside the traditional banking sectors. It is time to explore these same settings beyond uniformity.

As for the integration of financial markets, three points in particular are relevant to discuss. One is the fallacy of the forth level of financial integration by Herring, where further integration implies the progression from frictionless capital mobility to the uncovered interest parity. As seen in the EMU example, the fallacy arises from the belief that monetary convergence facilitates this transition since it eliminates the exchange rate related risks. In fact this belief creates incentives to underestimate the interest rates of the integrating economies. The progression to the level four requires thus an economic coordination considerably wider than the

monetary consolidation, the lesson the EMU economies are learning from the ESDC. Second is the fact that the measures of integration of financial markets remain nation oriented and thus fail to take structure into account. Arguably, equally important measures of financial integration could be the extent of international activity of the key (inter)national financial institutions, the internal flows of capital between the branches of these institutions, and even the sensitivity of the branching structures to the changes in business conditions between various regions. Third is the limited understanding of the mechanisms thorough which OFCs bring about financial liberalization in the adjacent industrial economies. The historical lessons from the North Atlantic financial liberalization can be highly relevant for the future financial liberalization efforts in China and they should be explored further, both by modeling and via empirical studies.

On the other hand, the European experience is presenting invaluable lessons about monetary convergence and consolidation, and about their interplay with financial integration. Monetary convergence can catalyze regional financial integration to the extent which can become burdensome, if not followed by an adequate increase in factor mobility and the reduction in asymmetry in the external shocks related effects on member economies. The process is thus conducive of financial development but it creates regulatory inefficiencies, if the political responsibility for the monetary governance is not established region-wide. Conversely, financial integration emphasizes monetary convergence as a hedging technique against the harmful exchange rate volatility, under the floating exchange rate regimes. The latter is particularly relevant for the unilateral monetary convergence efforts, where economies pursue various levels of 'import of monetary policies' from their principal trading partners. These economies

are thus heavily dependent on the trading partner's monetary policy, which, in turn, is progressively dependent on the state of the partner's financial system. Unilateral monetary convergence can therefore, under the mixed IMS, act as an important transmission mechanism for financial instability. The mechanism remains fairly unexplored, but the second group of reviewed CSSA models brings about the potential of combining the information from the data on financial exposures with the results obtained from the correlation methods applied on the stock indices, currency exchange rates or the interest rates on sovereign bonds. The combined information could possibly give a better insight in the extent of both financial and monetary integration and the behavior of these relations under financial turmoil or recessions.

Finally, the structural approach to financial integration can help address its effects on the information asymmetries and inefficiencies. Traditionally, deepening international relations between financial institutions are thought to reduce information inefficiencies. Moreover globalization of financial practices is emphasized as a mean for portfolio diversification, which is thought to be beneficial for both the individual institution and the wider system. An alternative perspective on the issue is that financial integration increases the asymmetry towards non integrating institutions / economies, creating strong pressures on these institutions to converge. The cases in point are the financial institutions of the eastern economies bordering the EU. Furthermore, the expansion of the signaling infrastructure, particularly in regard to creditworthiness is another aspect by which the asymmetry is increasing with financial integration. Should this effect be confirmed via empirical research or modeling exercises, it would imply that there exist new, neglected costs to financial integration, which the previous inquires failed to account for.

4. Conclusion

The global financial system is one of the most intricate manmade structures ever designed, but only recently it started to be addressed as a structure, a dynamic system of relations and financial flows directing mechanisms. For the largest part of their existence financial systems have been addressed in the economics finance and physics literature by examining the behavior of a set of representative institutions, by describing their individual or collective incentives and the dynamics of convergence to steady state equilibria, if existing. The developments which characterized the GFS in the past three decades, such as the process of financial integration and several systemic crisis events all emphasize the fact that structure is important, and in particular the structural changes. There is an evident need for the switch of the paradigm towards the approaches which can treat entire financial ecosystems and/or the properties which are emergent from this level of financial activity.

Understanding the processes such as the global financial integration, regional monetary integration, or their interplay, becomes then a quest of identifying and learning about the systemic events, which once set on track alter substantially the structural relationships that characterize the system. This inquiry undertakes an effort at identifying these events on a number of different functional levels and in a number of different contexts. Furthermore, it proposes three important research directions where better intuition is required. The first concerns understanding how the changes in the agent interactions at the micro level[200], affect the macro properties of the system such as systemic

risk. Moreover, this direction should examine the evolving nature of systemic risk under the listed micro-level revolutions. In the concrete example of extensive mergers and acquisitions, which occurred in the EU and the U.S. under the financial liberalization efforts, and which altered irrevocably the global financial landscape, it can be noted that academia has consistently avoided addressing the dynamics of the process, by merely focusing on the end product – the system with LCFIs.

The second direction acknowledges the entanglement of financial and monetary systems in the modern finance, and puts an emphasis on the ways in which monetary consolidation stimulates financial integration and vice versa. Important point which emerges here and is not properly addressed yet in the academic literature is the role of monetary transmission channels which emerge through unilateral monetary consolidations and the contribution of these channels to the spread of financial crisis events beyond the means of pure financial interconnectedness.

The last research direction which is encouraged following the analysis is the addressing of the information flows under financial integration, and the role information asymmetry plays in stimulating the buildup of instabilities in financial systems. The analysis points out at a number of occasions that financial integration can, opposite to the common perception, increase the information asymmetries in the system. This is partially due to the simple fact that with financial integration it becomes progressively more costly to discern useful form useless data. Partially, however, it is due to the emergence of globally active LCFIs which interact simultaneously in a great number of financial markets and with a great number of financial institutions. Thought these interactions LCFIs acquire intelligence and influence which is hardly

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[200] intensified competition, mergers and acquisitions, interactions between strongly and loosely regulated financial institutions, extensive securitization, financial innovation, etc.

matched by any regional, specialized financial institutions, and even by a great number of national authorities.

The inquiry emphasizes the usefulness of the CSSAs in addressing the abovementioned problems, by exploring the advances and shortcomings in a number of sets of models which deal with the interactions in financial systems and, directly or indirectly with the issues related to financial integration. The CSSAs and, in particular, the network theory approaches are invaluable in these efforts because they allow for structural treatment of financial systems, as well as direct examination of the effects of structural dynamics. An important advance here, appears to be the treatment of 'global' interaction networks between individual financial institutions, and not only their aggregates. This brings a dose of reality to the research, as in the modern, integrated settings, financial institutions are generally unconstrained by their nationality in their actions. Rather, a sufficiently large financial institution is likely to be active, at least for the sake of information acquisition, in any market which it has access to.

To conclude, the integration processes on the GFS and the NFSs offer a plethora of research opportunities, all of which are critically relevant for the future regulatory reforms and reorganizations of the systems. This inquiry recommends structural approach in both future modeling and empirical analyses of the issues.

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